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NOTES.

BET SUGAR.—The beet sugar production for the past year amounted to 5,575,000 tons, while the production from cane for the same period was 2,862,000 tons. The increase in the production of beet sugar can be seen on glancing at the world's output for the year 1850, when it only yielded 200,000 tons, while the cane crop for the same period was 1,200,000 tons.

EXPORT OF FRUIT TO LONDON.—*The British Australasian*, in referring to the experimental shipment of fruit from this colony to London, says:—That well-known fruit-brokers in London had reported very satisfactorily on the fruit which had arrived in excellent condition, and its quality was highly commended. It is expected that the colony will very shortly become a large exporter of oranges and apples, many hundred acres having been planted during the past few years.

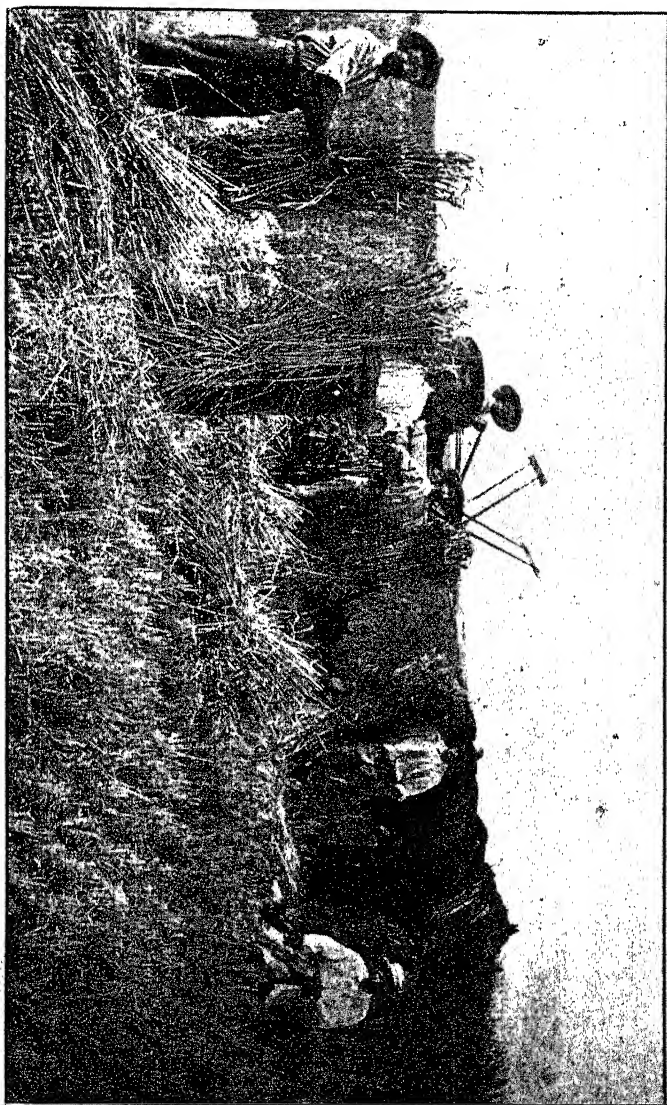
THOMAS' PHOSPHATES.—Statements having been made that the cost to the farmers in this colony of Thomas' Phosphate was much greater than that of the eastern colonies, the Hon. the Minister for Lands entered into communication with the Agent-General as to the cost of this manure in London, and the result of these enquiries show that the cost of Thomas' Phosphate in this colony compares very favorably with that charged in the eastern colonies, and that the price is not in any way excessive is proved by the cost of the manure in London and the freight added; being nearly equal to the price charged here.

IMPORTATION OF STUD BOAR AND SOWS BY THE AGRICULTURAL DEPARTMENT.—Some few months ago the Secretary of the Department of Agriculture, acting on a suggestion made by the Minister of Lands, instituted enquiries as to the advisableness of establishing a stud farm of Tamworth pigs at the Experimental Plot at Drakesbrook, as the outcome of which the Secretary now announces that the Department has completed the purchase of a very fine boar "King Rufus," from the Hawkesbury Agricultural College, N.S.W., and two sows from the well-known breeder, Mr. G. T. Chirnside of Werribee. All three animals are of the famous Tamworth breed. Those wishing to avail themselves of the opportunity of improving their stock can make application to the Department for the purchase of the young; as a number of applications have already been received we would recommend early application to prevent disappointment. Those wishing can have sows served by King Rufus, at Drakesbrook, for the small fee of five shillings. From information to hand, pig-keepers highly approve of the Department's action, and intend to avail themselves of the opportunities offered them.

INCREASE IN THE PRODUCTION OF OLIVE OIL.—During the last seven years California has increased her output of olive oil nearly 50 per cent. In 1893 686,852 gallons were produced, while in 1900 it reached 967,702 gallons. An official return gives the quantity of olive oil produced in Italy during the year 1898-99 at 51,750,000, as against 36,000,000 gallons in the preceding twelve months, and 42,820,000 gallons in 1896-97. The region of the Southern Adriatic produced the most, 18,450,000 gallons, while Sicily produced 9,000,000 gallons, the Southern Mediterranean region 7,500,000 gallons, and Tuscany 7,000,000 gallons. The locally made olive oil—though there is very little of it—is superior to the imported. The olive flourishes in our poor coastal lands, and should be worth millions to the country.

WHERE "PRIME DORSET" BUTTER COMES FROM.—In reference to the recent report of the conversion into "prime Dorset butter" of butter imported from Australia, a correspondent writes: "The growth in the production of 'prime Dorset butter' has been marvellous these last 10 years. So vast, in fact, has the industry now become that it may well be regarded as one of the wonders of the closing decade of the nineteenth century. The striking feature of this growth is that it has advanced year by year, notwithstanding that the number of dairy cattle in Dorset has been practically unchanged, that the manufacture of cheese has been greatly on the increase, and that the milk trade with London has yearly assumed larger proportions. There is the mystery. There is little doubt that Australian dairymen are not alone in finding their butter palmed off on an unsuspecting public as the produce of Dorsetshire. Irish, Danish, and Normandy undergo a like metamorphosis."—*Mark Lane Express*.

FINE CROP OF WHEAT.—The Secretary of the Department has received the two interesting photos from Mr. E. Powell, of Severn Grove, Beverley, which are produced in this issue. The first shows the harvesting of wheat from what Mr. Powell calls his hundred acre paddock, this is remarkable for the uniform height of the crop which is nearly 6ft., and is another proof of the productiveness of the soil in this district. In a letter accompanying the photo Mr. Powell says:—"I intended cutting the crop for hay, but owing to the binders going wrong it got too ripe, so I had to leave it for wheat. We are now busy stripping it; those who have seen it say it will go 40 bushels to the acre, this is my opinion too. I am also sending you a photo of the homestead; I thought you would like to see them, so you may know we are not quite fossilised." [We can assure Mr. Powell that there is no fear of anyone accusing him of being fossilised, after a glance at the photos, and at the same time we congratulate him both on his splendid crop and the very comfortable homestead he possesses. Ed.]



FINE WHEAT CROP, NEARLY 6 FT. HIGH, GROWN BY MR. E. POWELL.
(See Notes, Page 4).

CULTIVATION OF RAMIE.—On several occasions the Department has drawn attention to the possibilities of ramie cultivation in this colony. Cheap labor is a vital essential. The matter has again been brought under the notice of the Secretary by Mr. W. E. F. De Lacy, of Marble Bar, who has forwarded the following letter taken from the *London Times*. "Lancashire is threatened with a serious loss. Why do we not profit by our lessons? When the last great famine took place, during the American war, we were shown the folly of relying on one country for our supplies. Why do our colonies not benefit by the lesson? We should be independent of any one country for our supplies. We have a vast territory where we could grow ramie, which is a fibre far superior to cotton. It will grow where cotton grows and where it will not. The possibilities of this plant are enormous. It grows wild in India and many of our possessions. It is the strongest fibre and invaluable as a textile. It will make anything that can be made by flax, wool, cotton, or silk. Our sugar plantations do not pay. Dr. Morris, of Kew, recommends ramie growing to planters. If our colonies would turn their attention to ramie growing the possibility of a vast industry being crippled for the want of supplies would be a thing of the past."

ROEBOURNE.—Mr. Alfred Paterson, manager of the Yarraloola Station, belonging to the Robe River Pastoral Co., who is on a short visit to Perth, called at the Department of Agriculture, and during the course of an interesting conversation stated that Yarraloola Station is situated about 1,000 miles due north of Perth, and about 20 miles from the coast. There is, he said, a great depth of soil on the alluvial flats on the Station, at least 6 feet of rich loam. The rainfall for last year was very good, 19½ inches falling altogether, for the three years preceding that, however, it did not average more than fifteen inches. Rains usually set in about January and continue through February and March. The growing season begins properly in March, as it is too hot to start earlier, anything planted before is invariably burnt off by the sun. The temperature varies from a maximum of 119 to a minimum of 35, but no frost, the average is about 85° F. All kind of fruit trees and vegetables seem to grow well. Oranges, lemons, figs, bananas, apples, vines and Cape gooseberries are all thriving. It was suggested that pineapples, mangoes, and passion fruit should be tried. Vegetables do well. Mr. Paterson produced specimens of sweet potatoes he had brought down with him, that averaged nearly a pound a piece. They were dug in November last, 13 weeks after planting the vines. The yield was most prolific. As regards the water, that used was pumped up from a well by a windmill from a depth of 35 feet. Good stock water can be found almost anywhere at a depth of from 6 ft. to 25 ft. In May last, Mr. Paterson made an ensilage pit, the first in the district, using indigenous grasses for filling, and the experiment had been quite successful.

SHEEP.

BY PERCY G. WICKEN.

NAMES GIVEN TO SHEEP AT VARIOUS PERIODS OF LIFE.—At different ages the sheep is known by a number of different names. The *male* is called a *ram* or *tup*, while he is with his mother he is called a *tup* or *ram lamb*. From the time of his weaning until he is shorn he has a number of names, he is called a *hog*, a *hogget*, a *lamb hog*, *tup hog*, or a *teg*, and if castrated, a *wether hog*. After shearing, when probably he is a year and a half old, he is called a *shearing*, a *shearling*, a *shear-hog*, or a *tup*; and a *shearing wether* when castrated. After a second shearing he is a *two-shear ram*, *tup*, or *wether*, and so on.

The *female* is a *ewe* or *gimmer lamb* until weaned; and then a *gimmer hog*, or *ewe hog*, or *teg*. After being shorn she is a *shearing ewe*, or *gimmer*, or *double tooth ewe*, or *teg*; and afterwards a *two-shear* or *three-shear*, or a *four* or *six-tooth ewe*.

The age of a sheep is not reckoned from the time they are dropped, but from the first shearing, although the first year may often include fifteen or sixteen months and sometimes more.

DENTITION OF SHEEP.—The teeth of the sheep are the same in number as those of the ox. The full grown sheep has 32 teeth. There are eight incisor or cutting teeth in the forepart of the lower jaw, and six molars above and below on either side of the jaw, Youatt, the great authority on sheep says:—"A newly-dropped lamb is sometimes without incisor teeth and sometimes it has two, but if

Fig. 1.



Fig. 2.



Fig. 3.

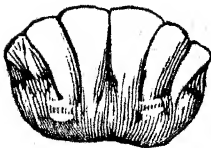


Fig. 4.



Fig. 5.



Fig. 6.

THE TEETH OF THE SHEEP.

not they make their appearance during the first week, the others come on rapidly, and by the time they are a month old they have the eight milk teeth, they continue to grow with his growth until he is about fourteen or sixteen months old." Fig. 1 in the illustration gives a

fair representation of the mouth of the sheep at this age. Then the two central teeth are shed, the permanent broad teeth appear and attain their full growth when the sheep is two years old. Fig. 2 shows the mouth at this age. Between two and three years old the next two incisors are shed, and when the sheep is three years old the four central teeth are fully grown, as shown in Fig. 3. At four years old he has six permanent teeth as shown in Fig. 4, and at five years old the teeth are perfectly developed and he is called an eight-tooth, as shown in Fig. 6. The careless examiner may sometimes be deceived with regard to the four year old mouth. He will see the teeth perfectly developed, no diminutive ones at the sides, and the mouth apparently full, and then, without giving himself the trouble to count the teeth, he will conclude that the sheep is five years old. A process of displacement as well as diminution has taken place here, the remaining milk teeth are not only shrunk to less than a fourth part of their original size, but the four year old teeth have grown before them and perfectly conceal them, unless the mouth is completely opened. Fig. 5 represents this deceptive appearance. After the permanent teeth have all appeared, there is very little criterion as to the age of the sheep.

In examining a flock of sheep there will often be a very considerable difference in the teeth of the hogs or one-shears, in some measure to be accounted for by a difference in the time of lambing and likewise by the general health and vigor of the animal. There will also be a material difference in different flocks, attributable to the good or bad keep which they have had. Those fed on rich land and good pastures will take the lead of those fed on starved or poor lands, and will renew their teeth sooner. There are, however, exceptions to every rule, and numerous instances are quoted where animals which should have shown two permanent teeth have shown none. Other irregularities occur in the teeth at times which cannot be accounted for.

At 6 years old the incisors commence to decrease in depth and lose their sharp appearance, and at 7 or 8 years they become open and commence to wear down very low or fall out, but it depends very much on the pasture they are on. As soon as sheep become broken mouthed they begin to decline and they are best disposed of as soon as possible, as they begin to lose condition and will not fatten, and the wool declines in quality. The natural age of the sheep is about ten years, although instances are given of sheep living much longer, they would hardly be profitable. The back teeth of a sheep, the molars or grinders, are well adapted for chewing up and reducing to a pulp the roughest herbage.

BREEDING.—The ewe should not be put to a ram until she is at least four-toothed, or nearly two years old, and she should be fully four-toothed when she drops her first lamb. It is a great

mistake to commence breeding earlier than this as it weakens the constitution of the mothers and they never do so well afterwards. The period of gestation in the ewe is 20 weeks. The ewes should always have a spell of two or three months after weaning before being put to the ram again, but should not be allowed to put on condition too rapidly.

A ram may serve a limited number of ewes at two-tooth but it is desirable that he should be four-toothed before being used for stud purposes. A ram will serve from 60 to 100 ewes according to circumstances, but in small enclosures he will serve many more than in large ones. If possible the ewes should be yarded every night with the ram during the tupping season. It is not good management to run too many rams with a flock of ewes at the same time, it is much more satisfactory to divide the rams into two lots and to change them every week or so. If artificial feeding is necessary for the rams during this period crushed oats is the best food that can be used. Five or six weeks is long enough to allow the rams to run with the ewes and if removed then the lambs will be about an even age. When the lambs are about two months old they must be brought in during fine bright weather and yarded so that they can be ear-marked or branded, castrated and the tails docked. These operations should be done at one time and as quickly as possible so as not to excite the animals. The lambs should be kept moving for a time after the operation is performed so as to prevent them from becoming stiff; with good management not more than 1 per cent. are lost, but much depends on the weather; hot muggy days should be avoided as the flies worry the lambs and get into the cuts and cause serious trouble. If the season is cold it may be better to choose days somewhat moist as the flies are not bad, and a cold dry wind prevents the sores from healing and so causes loss. Care should be taken to use a clean knife for this operation as blood poisoning is often caused by using dirty materials. After these operations are performed the lambs are allowed to return to their mothers, and if any are too weak to do so the ewes should be allowed to come into the yard and supply the lambs with some milk. When the operations are complete the flock resolves itself into three divisions, namely, the ram hogs, the ewe hoggets, and the wether hoggets or wethers.

BRANDING.—Pitch or tar should never be used for branding sheep, it is difficult to scour out of the fleece and deteriorates the value of the wool. A common material used for branding in the Australian Colonies is lampblack and boiled oil, mixed in the proportion of $\frac{3}{4}$ to 1 lb. of lampblack to 1 lb. of boiled oil. Tallow and lampblack, if mixed together until of the consistency of paint, is also a good mixture, but must be kept warm while using. If red is desired, venetian red is substituted for lampblack; if blue, ultramarine; and if green, a mixture of ultramarine and yellow may be used.

A good American mixture is—shellac 2 oz., borax 2 oz., water 25 oz., gum arabic 2 oz. and lampblack. Boil the borax and shellac in water till they are dissolved and withdraw from the fire; when the solution has become cold, complete the 25 oz. with water, and add lampblack enough to bring the preparation to a suitable consistency.

The tallow and lampblack mixture is the simplest and generally the cheapest, as there is often plenty of tallow available for use. The best way to keep the mixture warm is to use a glue pot and keep full of hot water. It is also the easiest to wash out in the scouring.

A branding implement is now in use in which the material for use is contained in the handle. It is said to answer well for large flocks of sheep, being easy to use, and expeditious in branding a large flock.

EAR-MARKING.—A number of instruments are now in the market for ear-marking sheep, which consists of punching a mark in the ear on the same principle as the railway authorities do with passengers' tickets; any shape or figure can be used as a brand in this way. Ear-marking in this manner was formerly always performed with a knife, but the punches now made make a much cleaner and more uniform mark than a knife, and are also much quicker. If desired the marks on the ears can be so arranged so as to show the age of the sheep. Marking sheep by cutting off the ear close to the head, commonly called the "rogue's mark" should be prohibited. All ear and other brands should be registered.

FIRE BRANDING.—This method is not much in use at the present time. The brand consists in making certain marks on the nose or face of the sheep with a hot iron; if not carefully done it disfigures the animal very much.

NOTICE.—The JOURNAL of the Department of Agriculture will be issued monthly, as nearly as possible on the 15th of each month. The annual subscription has been fixed at 2s. 6d. (single copies 3d. each). Members of the Western Australian Parliament, Agricultural Advisory Board, heads of Departments, kindred departments and learned societies in other parts of the world, public libraries, the presidents and secretaries of all societies registered on the books of the Department of Agriculture, Wardens, Agricultural Halls, Mechanics' and kindred Institutes, advertisers, the press, and those who send agronomic publications in exchange are entitled to receive the JOURNAL free. All other persons who may wish to receive the JOURNAL must forward 2s. 6d. (postage stamps not taken) to the Accountant, Department of Agriculture, Perth, and this will entitle them to receive all the publications issued by the Department during the ensuing twelve months.

NOTICE TO CONTRIBUTORS.—The Secretary, Department of Agriculture, will be pleased to receive contributions for the JOURNAL on agronomic subjects generally. These should be brief and to the point, and written on one side of the paper only. Reports on the state of crops and stock and produce movements in the various localities will be much appreciated.

THE CAUSE OF UNSATISFACTORY RESULTS IN HORSE BREEDING.

BY A. CRAWFORD.

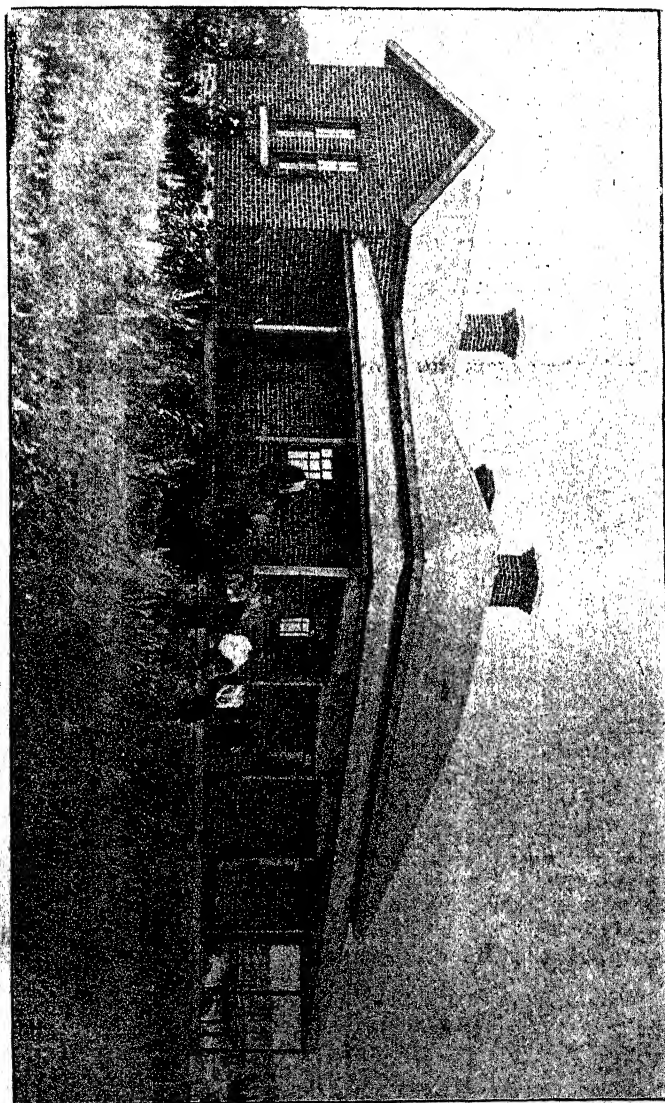
The late call to arms in the Australian colonies has opened the eyes of many to the generally poor quality of the bulk of the horses that are bred. The matter is a serious one, one that needs looking into at once. We must first endeavour to find the cause and then suggest the remedy.

The horses that are wanted are of two classes, one stout, active animals that will carry with ease a mounted man and all his accoutrements up to say about fifteen stone, one that can walk well, trot and gallop fairly, the other a little heavier for draught purposes, for artillery, the thoroughbred horse will not do, as although the spirit is there, the flesh and bone are wanting. The draught will not answer, for the bulk is too heavy for quick work. What we must get is a proper commingling of both bloods.

It may be said that we have hundreds if not thousands of this class of horse bred every year, light mares put to heavy draughts, and in most cases the result is unreliable. Why is this? A draught stallion travels the district serving a great number of mares, and yet when the foals come they are an unsatisfactory, nondescript lot. They bear no distinct impress of their sire. The only reason that I can assign for it is that the sires are not from pure bred pedigree stock. For a moment let me look at other breeds of stock and see how they are effected. Take cattle for instance. Some time ago the Government imported some Jersey bulls of undoubted pedigree and long descent, for the past three years these bulls have been serving cows of all breeds and no breeds, and what is the result? Out of some hundreds of calves, I have only seen one calf that does not strongly show the impress of the sire. The many generations of pure blood with no admixture of other, or cross of any kind, have established a prepotency or power of reproducing like in the bull to get stock resembling himself, and the longer the race has been in existence and free from cross the more is this power developed. The Durham or Shorthorn of to-day is a comparatively recent breed, and does not stamp his image on his stock to anything like the same extent as a Devon or Hereford or Jersey bull will do.

In the sheep the same holds good. A ram of long pedigree and excellence will bring a thousand guineas or more, because the breeder can be certain that his influence will be felt over all his offspring.

A first-class pedigreed boar, even when bred on the poorest breed of pigs we have here, will make a marked improvement on the litters. The same holds good with human beings, the British race is a recent one crossed and re-crossed for ages. The Aus-



MR. E. POWELL'S HOMESTEAD, SEVERN GROVE
(See Notes Page 4).

tralian aboriginal is pure and without cross for perhaps thousands of years, and when the cross between the white and black race occurs, the children have always far more of the resemblance to the dark parent, not only physically but mentally.

The old adage, "like begets alike," is only true to a certain extent. Heredity has far more to do with it than the immediate ancestor. For that reason it is that all cross bred sires of any kind are unreliable. For instance, if we use a ram that is a cross between a Shropshire and a Cheviot and a hundred ewes that are a cross between a Merino and Lincoln, and breed them, the result will be that there will be lambs showing strong resemblance to Cheviots, Shropshires, Merinos and Lincolns, as well as mongrels not taking after any of the three ancestors. What a mixture of wool these would give, and what price could be expected for it if it were all packed in one bale without being sorted.

Well now to get back to our horses. Is there a pure bred pedigreed Clydesdale or Shire horse in the colony? One of undoubted pedigree for ten or twelve generations or more? I doubt it. If then, that is the case, how can we expect the results in horse breeding to be anything else than what they are.

I know something of draught horse breeding in the other colonies, and there are undoubtedly some pure pedigreed horses there, and also some pure pedigreed mares, but the latter are few in number, and it takes a very long purse indeed to get one of their offspring. As a rule with most breeders of draught stock, they are always on the look out for good looking, well made draught mares, and wherever they see them they are always open to purchase them at a good price. They are put to the imported pedigreed horse and the result is in most cases that the foal takes after his sire, and grows into a fine looking horse, not unfrequently a larger and in many ways a finer looking animal than his sire, on account of the more favourable climatic surroundings, and if the two were put up for sale, on appearance only, the younger one might bring double the amount of his sire. But it is when we come to use them for the stud that the weak link gives. With the imported sire with unbroken pedigree one can depend on practically all his stock taking after him, more or less according to their dams. With the younger sire it is just a chance if any of them takes after him, unless the mare herself have a good deal of pure blood in her. Wonder is expressed that his stock does not turn out better. There need be no wonder about it, the law of heredity has not been taken into account.

Until we get sires here that are not merely fine looking horses, but that have the blue blood of generations in their veins, we need never expect to rapidly raise the quality of our young horses.

There are thousands if not tens of thousands of mares with a bit of blood in them, that are in themselves weeds, that if mated

with a pure bred Clydesdale would give the stamp of horse required, and that same stamp of horse would be one of the most useful on the farm—an active horse, a good walker, and one that would be much more suitable for general farm work than the great heavy slugs that one so often sees crawling along at about the rate of a mile and a half an hour. Instead of two heavy slow horses, far better and double the work might be done by putting in three active horses of lighter build that would do their three miles an hour and keep it up with ease. If heavy slow work has to be done use bullocks, and when the necessity for that kind of work is over they can be turned into beef, instead of, like the horses, eating their heads off for years.

To get the stamp of horse required I believe could be imported from England or Scotland cheaper and with greater certainty of being what is wanted than from the other colonies, and besides that, coming from a more rigorous climate, his constitution would be probably sounder. The horses that would probably suit us here are either the Clydesdale or the Suffolk Punch. The Clydesdale, although a heavy horse, is particularly active for his size, a good walker, a good trotter, and with good action. The Suffolk Punch is not so heavy and is also very active, but in some ways is not so reliable, especially in temper. The Shire horse is undoubtedly a fine horse for certain kinds of work, but he is too slow and sluggish for the kind of sires we want here.

In all the colonies the idea as to horse breeding seems to run greatly on the same lines, whether it be for draught or thorough-breds, *i.e.*, the sire is everything if he has won a race or taken a few prizes at an agricultural show, and pedigree is not taken into account. This is one of those things that the Government might well help, for it is a subject not only of importance to the colony, but to the *Empire*. In case of war the British Islands could not supply a tenth of the horses required, and if the war were with any great continental power they would be competing against Britain in the North and South American markets, and would probably act quicker and get the better of the deal. It is to Australia, and perhaps in the future to South Africa, that Britain must look for her remounts and artillery horses, both for home and India, and the sooner we set about breeding the right kind the better for us, not only from a financial point of view, but as regards the well-being of the Empire.

If the Government were to offer a bonus of two or three hundred pounds per annum for say 10 years, for ten pure bred draught entires, to be imported from the United Kingdom, and of undoubted pedigree and sound all over, these stallions to travel certain districts, and serve mares say at two guineas each, it might induce some of our horse breeders to import them. A first-class two-year-old could be had from two hundred to three hundred guineas, or well-known aged sires about the same price. A bonus

of fifty pounds for each pure bred draught mare imported from the United Kingdom would also be money well spent, as I do not suppose there is one in the colony. That our native bred stock is acknowledged to be inferior to that imported from the other colonies is proved by the fact that the different agricultural societies make special classes for W.A. bred animals. How long is this kind of thing to go on? That we must be dependent on the Eastern colonies for our stud stock when we could breed just as good if not better if we only had the stock to start on.

The question of putting a tax on stallions is a vexed one, and as we are at present situated a useless one, as it would not encourage any better class to come into the colony, but if the Government were to subsidise really first-class animals, ones as to whose breeding there was not the shadow of a doubt, then the tax, say £10, would be most useful, and gradually clear out the hundreds of equine monstrosities that are now travelling the colony. The tax would also go towards raising the subsidy fund.

The situation is serious, and its seriousness was forcibly shown by the difficulty experienced in mounting the few troops that were sent from here. To expect a man to trust his life to some of the brutes that went from here with the various contingents was little short of manslaughter on the part of those who sent them thus equipped.

The Agricultural or Stock Department should keep a stud book, and only animals qualified on the same terms as in the United Kingdom be allowed to be registered. For this a fee of 5s. might be charged.

No animal should be subsidised unless he was eligible for and registered in the stud book. By some kind of action of this kind the quality of our horses could be speedily raised.

Some first-class heavy-boned well-bred thoroughbreds ought also be subsidised for crossing on the heavier mares, but certainly not such as are seen getting prizes at some of our shows, that are little better than suited for ladies' hacks if emasculated. Bone substance and undoubted breeding and soundness we *must* have if ever horse breeding is to be a success in this colony.

Each horse ought to be examined *annually* by three experienced veterinary surgeons. Such examination to take place by each surgeon separately, and each one to send in his report without consultation with the others. Unless each surgeon declares the horse absolutely sound, no horse should be subsidised. If many of our prize-taking stallions were subjected to a veterinary examination and disqualified if not sound, how many prize-takers would we have? Not many, I am afraid.

THE INSECTIVOROUS BIRDS OF WESTERN AUSTRALIA.

BY ROBERT HALL.

MARTINS, SWIFTS, AND SWALLOWS.

As suggested in a preceding page, all swallows do not appear to be wood-swallows. But a great many of them are, ranking as the family *Artamida*.

Swifts, one may well say, live above us, and cannot be classed as cliff or house swallows. But they do come sometimes to within a few feet of the earth, and noticeably when most needed; that is to say when atmospheric influences cause insect life to rise from the ground in myriads. We generally recognise a still, peculiar air around us when swifts whiz past.

Two species of Swifts visit us annually, being located in the southern provinces about December, and leaving for their birth-place in the northern hemisphere in February or March.

Neither in name nor in action is the swift a loiterer. It may, for three or four days, stay in a tract of country say 20 miles x 20 miles, but it seems to work a colony east and west, always making a southward tend (*i.e.*) after breeding season. The return journey is probably more quickly made. A Swift has never been known to rest upon its feet in Western Australia, and only a doubtful once in any part of the continent. One species (spine-tail) breeds in China and the other in Southern Siberia. Both are so rapid in flight that they may breakfast in Asia and dine at Port Darwin.

The two species that come to us from China also go to Cape York, and down the eastern coast to Tasmania. One of these (spine-tail) has been known for a long time to reach the Leeuwin, and I should say, as its migratory limit at one end. Until last year the White-rumped Swift has not been recorded as a bird found in this colony.

There is no reason why the other Australian species should not also be found with us. Because it arrives in Queensland in December and goes no further south, surely is not the exclusive right of those folk who so successfully grow tropical fruits.

I feel sure we have undiscovered insect-eating birds in the north, and they merely need observation. Thus, the *Callocallia francica* Gray-rumped Swiftlet, may be one of them, and it should be recognised by the total length being just over 4 in., wing 4.4 in., and tail 2 in., without spines to the feathers. The wings extend so very much beyond the tail that no error can be made when handled.

The two species that visit us, of which so little is yet known, are :—

Micropus pacificus, Lath, White-rumped Swift; *Chaetura caudacuta*, Lath, Spine-tailed Swift. The former has a forked tail without spines, and a wing 7 inches in length. The latter has a tail with strong spines at the exposed end, and is the only member of the Australian swallow with them.

The birds under present notice that are more often seen by us and of most use undoubtedly are the House-Swallow, Tunnel-Swallow, and two Martins.

The first is of most economic worth, and some details of its life history will not be out of place here.



HOUSE-SWALLOW (Welcome Swallow).

Hirundo neoxena, Gld. (*Hi-run dō ne-ō-ēz nā.*)

Hirundo, a swallow; *neos*, new; *zenos*, strange.

Hirundo, neoxena, Gould, "Birds of Australia," fol., vol. ii., pl. 13. "Key to the Birds of Australia." Hall, p. 47 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas, 9, 7, 6, 5, 4, 3, 2.

KEY TO THE SPECIES.—Tail forked; throat rust-red; abdomen white; ear coverts glossy blue, like black; nostrils lateral.

This beautiful creature of the air is quite content in a moderately mild winter season, to stay in the southern districts. In March, 1896, the birds I remember seeing assembled in hundreds, and I was inclined to conclude one contingent was preparing to make a journey.

These birds settled on the projecting mouldings of a building, each uttering a single note, which collectively constituted a din of weak voices. I know of a flock of several hundreds entering a school building, which is believed to have been the arrival of the flock in their return migratory journey. It is well for the agriculturists in the district that this flock kept the even tenor of its way. In March there are three features observable about these birds. At first that they are combative. One pair for several minutes fought while on the wing; having ascended a high altitude a downward chase followed, when they appeared as comet-like objects floating rapidly through the air, chattering all the time. Secondly, that the male is a vocalist with a considerable amount of ability, for if the sun be shining, as you know it often enough does at that time in this bright country of ours, a strain of music continuous for minutes is produced, while it rests upon a post or other suitable object. As it now wishes to choose a partner for the next and following months, it must need be busy with the duty of the season. Thirdly, that owing to the amount of moisture regularly falling upon the ground, they find a part of their sustenance there. As one floats above the short grass the little body assumes an ovate form and the tail feathers become lowered. The short legs prohibit them from standing anywhere other than on a flat surface, and it is not unusual to have them rise from an asphalt path as you approach. Swallows gather moths and other insects from the grass as they rise, noiselessly hovering within a few inches, and at times appearing motionless. On the 3rd of April I was interested in watching 14 swallows skimming the surface of a reservoir. This was at 4.45 p.m., and soon the active flock became 23, after which the number quickly reached 70. The arrivals all came from the south, and still continued until the number totalled about 200 in 30 minutes from the arrival of the first group. They arrived in companies of from 12 to 18. The sun was brightly setting and the weather mild. The scene above the artificial lake was truly a pretty one, with the distant birds of apparently small proportions and light color, while those in the foreground were large and dark, all gliding in a circular form till one almost imagined the whole scene was in revolution. The flock left at 5.30 p.m. as the light faded, and all occurred as in an instant, and I was left to contemplate, with only a faint idea that they had moved northwards to their usual roosting place in a group of timber.

It surely goes without saying that everyone is familiar with the common or House Swallow, yet such facts as the following, gathered by the writer and an able correspondent, Mr. George Graham, will appear as new to us in the natural history of the species.

Nesting Habits.—The species starts to nest in July if the weather be favourable, though the month will vary with the season and latitude. It is an early and late breeder. The chosen position of the nest is a very varied one, such as in caves, spouts of trees over water, barns, under verandahs, and even in a dog-kennel, if the dog has been absent some time. In this latter position the bird has been known to breed for five years. Whether or not the birds resort to the same nest annually I cannot say, but since 1881 two nests in the same hollow of a tree have been occupied each year during the whole 16 or 17 years up to 1898. One of these nests was pulled down on the 16th year prior to spring, and was not rebuilt. I take it the birds were turned aside from the usual custom and went elsewhere. In the building of a nest the birds occasionally make a mistake, and persist in doing so. If the nest falls they start again, and a second time it falls. On other occasions nests are partially built and abandoned. A pair will start a nest, and by the time it is half done a number of swallows assemble, fly to and from the nest, twitter considerably, and work is suspended apparently as a consequence. Such nests are not again touched.

It is interesting to know that a House Swallow in England hatches its eggs in exactly the same time as one in Southern Australia. The following four observations show:—(a) an egg is laid on each consecutive day; (b) the clutch takes 15 days to incubate; (c) the young open their eyes on the ninth day; (d) the young left the nest in observation I. in 24 days, in observation IV. in one calendar month (30 days).

Observation I.—August-September, 1899. To last year's nest, in a much weathered hollow at the base of a eucalypt trunk, the birds commenced additions as early as 6th August, and by the 13th a new tier of plaster, one inch thick was laid. Immediately following this an inner lining of rabbit's fur, feathers, etc., was fixed in ample time for the first egg. First egg deposited in nest 23rd August, second egg 24th August, third egg 25th August, fourth egg 26th August, fifth egg 27th August. The birds immediately sat, and brought out five young on the 11th September. On the fourth October young left the nest for the first time.

Observation II.—September, 1899. To experiment, the old nest was broken away and taken quite out of sight of the birds. This gave an opportunity to find the time required to build a complete nest. The operation commenced on 7th September, and by the 19th instant the earthen cup was finished. By the 30th inst. the lining was fixed and an egg was laid. Without giving any clear explanation, the owners made no further advance with this nest, and the single egg remained unincubated.

Observation III.—October-November, 1899. The first egg was deposited in nest on 12th October, and a second on the following day. Several days watching showed no further development.

Considering the nest was abandoned the observation ceased. Passing the nest some weeks later two young were found to be progressing favourably.

Observation IV.—October-December, 1899. Nest in bole of eucalypt. The second egg was deposited on 18th October, the third on 19th, and fourth on 20th. By analogy with this species the first egg was laid on the 17th October. On 5th November the young hatched out, their bodies being rather nude and the down grey. The eyes opened on 14th November. Young growing rapidly on 17th November, quills well out and showing grey tufts. By the 19th inst., the grey is giving way to black, with chocolate on throat and vest. At this stage the young are so strong and cling so tenaciously to the nest, that it is dangerous to take them out for examination, especially on the 22nd inst., when the crown and back are dull black. On 5th December the young left the nest for the first time.

When it is found a clutch of eggs will not develop, certain birds, such as the Magpie, place a false flooring to the nest, thus covering the eggs, and immediately relay. Judging from the following note, it is most probable the swallow does not come under this head, but under the one where birds turn out their eggs when proved valueless. "In a hollow trunk that has been used for 15 years," writes Mr. Graham, "I found the nest, freshly lined with feathers. Shortly afterwards I felt an egg in it, and on the following day two additional, thus proving carelessness in my touch, or that three eggs were laid in 48 hours. I do not believe an error was made on my part. On the fifteenth day all three eggs disappeared. About nine days later three more eggs were found in the nest, and they are there now (weeks later), probably infertile, as doubtless were the others. There are no cats or bird-nesting boys in this neighbourhood, so I venture to think the birds, finding no young came on the appointed day (fifteenth), threw them out."

Young.—The providing for the young necessitates each parent visiting the nest every three minutes. This is done alternately, judging by 20 visits to the nest in one hour, of which each sex made 10. If only one nestling is supplied at a time, the five in the family would be fed every 15 minutes. After the young have quitted the nest for the first time they return during the heat of the day for several days following. The pipe in the tree above the nest serves the family as a night camp for 10 to 11 days after the young have first left the nest. The non-sitting bird camps in a place apart from the nest during the period the nest is tenanted. While the majority leave the district during the early autumn a few remain, and then the old birds sing or twitter as well apparently as in the spring. It is not unlikely that this is a training for the remaining young in preparation for the following spring and summer.

Introduced Enemies.—The fox and cat from the mother country cause considerable trouble among Australian birds. The cat, at the moment I have noted, is raiding the dry parts of the north-west, just as the fox is doing in south-eastern Australia. I know the hall of a country house that has a nest in it, and two nails below, upon which the two birds perch in the dusk. In six weeks previous to 1st October, 1898, seven birds were killed by the cat that kept its place in this lobby. If one of a pair was caught the mate would go away for about one to three days and return with a consort. In a day or more one of that pair would be captured, and away the other would go for a mate and return with it. As to which sex was killed no one could say, but I should think the same one, and every time the stranger, thus showing persistency of one bird to follow up an idea, just as one of the same species will start to rebuild its nest after it has been purposely knocked down on four occasions within a month.

In those districts where swallows build mostly in burnt-out trees, the fox makes a thorough inspection, and all that are not more than 6 ft. or 8 ft. above the ground sooner or later are precipitated, sometimes when empty, at others when containing the sitting birds. The fox will jump or scramble up the distance and grasp in its mouth nest and bird. It seems most unfortunate this scourge should have got among the Victorian terrestrial fauna, of which that beautiful form the *Menura* has not suffered least.

Nest.—Open, made of mud, and cup-like, the inner lining being of feathers or grasses.

Eggs.—Ground colour white, much spotted with ruddy brown or faint lilac. Clutch, four to five eggs. Length, 0.75 in.; breadth, 0.85 in.

(To be continued).

THE SOUTH-WEST DISTRICT, AND SHOWS.

BY A. CRAWFORD.

During the past month I have visited the Bunbury, Busselton, and Bridgetown shows, with the dairy plant belonging to the Department of Agriculture. In addition to the dairy plant there has been added, this season, an exhibit of bee-keeping appliances, and at all the shows these have come in for a great amount of attention. The ravages of the Bee or Wax Moth have been so great that in many places the bees have been practically destroyed, as only the old-fashioned kerosene case hives and black bees were kept. This being so it was simply impossible to fight the intruders, and the result was the bees perished. Many persons were deterred from going in for bee-keeping on the modern lines from want of knowledge and from expense, but when the system was explained

to them its simplicity at once recommended itself, and they are in many cases going in for the box-framed hives and Italian and hybrid bees. Between the shows I have been going about various parts of the South-West district, giving practical examples of how to use the box-framed hives and how to transfer the bees from the old hives to the new, with the most satisfactory results. I have also to report that a good many persons who have seen the working of the box-framed hives have started bee-keeping for themselves who have never kept them before.

In the South-West, this year, the shows have on the whole been rather disappointing, and not equal to the past few years in most cases. Bunbury was exceptional this year in its butter exhibits, over 60 samples being sent in. This, I believe, is the largest entry of butter the society has ever had, and was occasioned by Mr. Teesdale Smith giving a special prize of ten pounds. On the whole the quality was good, the greatest fault being that the buttermilk was not properly taken out of the butter, from which, when cut, the milk oozed out. Some of the best butter exhibited would have compared favorably with any in the Eastern Colonies, thus proving the fallacy of the oft repeated statement that we cannot produce good butter in this colony.

Dairying stock, although in the whole district increasing rapidly each year, was very poorly represented at each of the shows. In the South-West are to be found some very well-bred Jersey stock, and still more "grade" Jerseys, but their owners do not seem to care much about showing them. Pigs were in all the shows very poorly represented as far as numbers go, but the quality of those shown was in many instances very high indeed. In nothing has there been such a remarkable improvement in the past few years as in the breed of pigs. Some of those shown would have been able to hold their own in the premier shows of the colony. Exhibits of poultry were also few in number, and taking them all round, not to be compared to those of two or three years ago. This can partly be accounted for owing to the death of the late Mr. Hearman, who used to take a large contingent from his noted yards to the South-West shows.

One reason that may perhaps account for the poorness of the shows this season is the fact that there has been such a bad season. The potato crop, with many, has been practically a failure, and even where the best returns so far have been obtained, they have not been equal to other years. Oats have been on the whole, so far as I can learn, about the best crop this season. I am greatly pleased to find that all those I came in contact with who got *Paspalum Delatatum* roots last season speak very highly of it and large orders for seed will probably be given this coming season. Unless the local seedsmen greatly reduce their prices for it most of these orders will go direct to the Eastern Colonies, where it is now quoted at 1s. 6d. per lb.

PIG-KEEPING.

BY "AGRED."

HOUSING.—Before coming to the consideration of the practical part of pig-tending, some remarks upon the housing of the pigs may be in place. There is one point which the reader is requested to bear constantly in mind: the object of these papers is not exclusively to show how pigs can be most cheaply produced, but rather how they can be profitably reared and a considerable amount of valuable manure produced. In the present system pasturing in summer and proper housing in winter are advocated, using the terms summer and winter as embracing the dry and the wet seasons. There is both expense and labor attached to the attainment of this system but if carefully conducted satisfactory results will follow. In planning pigsties warmth in winter and coolness in summer are the main considerations. In cold weather a considerable amount of the food given to pigs is absorbed merely in keeping up the heat of the body, and it is obvious that where stock are warmly and comfortably housed less food will be required to maintain the body heat at its normal temperature, than where the surroundings are wet and the animals exposed to every bleak wind that blows, and when we take the production and conservation of the manure into consideration, the plea for good housing is enforced. From how many pigsties does one not see the very essence of fertility flowing away in dark colored streams during heavy rains. If this be not a criminal waste of farm capital nothing is.

For these reasons, then, besides self-contained boar and breeding pens, another building for the accommodation of young growing stock during the severer months of the year is advisable. The size of this last building will be determined by the number of pigs turned out monthly. A shed, 100 feet long and 10 wide, divided into 10 pens, slab walls 5 feet high, bark or thatched gable roof, gives a cheap and effective house from which a fair number of porkers can be turned out. The floor should be raised at least six inches above the level of the ground. The house should face the rising sun, and the doors should be split horizontally so that every stray sunbeam may be admitted through the upper half without the lower half being opened. Such a shed has several disadvantages and could easily be improved upon to enable feeding and draining operations to be performed in dryness and comfort during wet weather, but such improvements involve extra expense and are unnecessary, though desirable.

With regard to breeding pens, it will be found by most breeders that care and attention to small matters in this respect are most remunerative. If such were possible, it would be best to have each pen with yard conjoined, entirely separate from other buildings; the next best method being to have a row of properly

fitted pens erected some distance from other pig houses. Many sows at, and soon after, farrowing are nervous and easily upset, and, unhappily, numerous deaths among the day or two old piglings are due to preventable causes when isolation does not prevent more disturbances than actual tending compels. There is considerable unavoidable mortality in the breeding pens without incurring avoidable mishaps. In the building of breeding houses more care should be exercised than is necessary with the feeding and boar houses. Draughts of cold air should be shut out as well as every drop of rain, and plenty of ventilation must be available in summer for few animals suffer so severely from excessive heat as heavily pregnant or suckling sows. 10 ft. by 10 ft. is a good size for each pen, and a good yard should conjoin each. A rail should run round the walls of the pen, about eight inches from wall and floor, and if this rail be put round the yard as well, a possible source of loss is avoided.

If the boar is provided with a snug retreat from the weather and a large yard for exercise, his wants will be supplied. It may be found convenient to divide this yard with a "cross" fence for facilitating putting in and taking out sows should the boar be rusty tempered as they often are. For his own sake he should be kept apart from the herd of sows, though one may be penned with him for company's sake should he fret when alone. The boar's yard must be extra strongly constructed, unless he is to appear on the scene when least expected.

MANAGEMENT.—In coming to the actual management of pigs, the best course seems to be to begin with the unserved sow and follow her to farrowing and suckling, and there leave her to take up the treatment of the young pigs.

It is not a good plan to turn the sow in to the boar for the three days she is in heat. Both boar and sow suffer in consequence, and probably the young pigs. One service is as effective, as a rule, as a dozen. The sow should be run into the boar's pen, and after service should be removed and shut up by herself. The following day she may be put in again if it is thought advisable, but once is usually sufficient. She should neither be very fat nor very low at this time, and the course of feeding during the first three months of her pregnancy should be such that she is kept steadily putting on condition, and as in pig, sows fatten very easily, a moderate amount of food will effect this. A good pasture is sufficient for the first three months, but if the sow be kept in confinement one feed daily of rich food may be profitably used to supplement the bulk ration. A handful of peas, or a dash of oil cake is welcomed by her, and will be recovered later on when her condition becomes transferred to her progeny. Green stuffs of all kinds are probably the best foods as they keep the bodily functions in good order, and provide the required nourishment. When green stuff is scarce, and recourse is taken to richer foods to make up for a shortage in quantity, some form of bulky food should be given, for the stomach

of the sow should be filled once daily. Finally cut chaff, soaked in water in which a little oil cake has been placed, will be found a useful substitute. During this period, the sow, if nervous and afraid, should be handled occasionally, and be taught to meet her attendant on friendly terms, as some pigling's lives may be saved later on. A month previous to farrowing she should be given more liberal feeding, and a week previous she should be placed on the diet she is to receive while suckling her young. The writer has found sows fit for butchering to throw as good, if not better and more even pigs, and have as little trouble in farrowing as those only in good store condition. Farrowing takes place sixteen weeks after conception. A little observation will prevent anyone being taken by surprise. A few days before the litter is expected the sow should be put in the breeding pen so that she may become used to her surroundings. A small quantity of dry, soft bedding should be allowed her, but a small quantity only. Pigging generally occurs at night time. Usually the sow makes a heap of the bedding in the evening previous, though many sows neglect this entirely. It is certainly the safest course to be on the scene when the pigs arrive. If everything goes along smoothly no interference should be made. Particularly with young sows farrowing for the first time is a watchful eye necessary. Quite recently the writer had a young sow become first frightened and then savage as the little pigs appeared, and only with difficulty and patience was she prevented from eating them and induced to take kindly to them. It will often be found a good plan to place the piglings in a box, one by one, as they arrive until the farrowing is finished. In many litters there are weedy youngsters among the piglings. It will be found profitable to knock these on the head and boil them for chickens or laying hens. They seldom, if ever, thrive like the stronger pigs, and are always eyesores and reducers of profits. If the litters are small some pig keepers do not care to destroy these puny weaklings, but four pigs that pay are better than five, one of which makes pork at a loss. This principle throughout pig breeding, dairy farming, poultry rearing and similar industries is a stumbling block to a great number.

When the sow has finished pigging, as much warm slop as she will drink may wisely be given. This will satisfy her thirst and keep her from fidgeting about for some time. To keep her lying quiet at this time is to remove the main source of infant mortality among the young, and it is for this reason that isolated pens for each sow are really best. Where such can be given the sow can be kept lying quiet night and day for the first few days, by allowing her night and morning as much warm slop as she cares for. There are no causes for disturbance from feeding other pigs or from suspicious sounds that rouse her to spring up in imagined defence of her young, and in such a case none should go near the pen except for the purpose of feeding. Tending should be done quietly and without fuss, and when the sow is irritable and "nervy" extra carefulness

to avoid rousing her should be taken. Stress is laid upon these remarks for, if fair-sized litters are to be maintained through a herd of sows, these precautions are very needful. Feeding should be done in the pen yard and if the weather be moderately warm the door between pen and yard should be left open, taking care that any youngsters that may follow the mother out may not find any obstruction to getting back again.

For the first week or ten days there is no advantage in feeding heavily; indeed light diet is to be preferred. Watch should be kept after pigging is done to see that the waste is properly thrown from the sow. Some breeders give a laxative powder previous to farrowing, but such is rarely required unless the sow is out of order generally. If however the bowels do not act within 30 hours of pigging, an ounce of Epsom Salts in her slops will have the desired result.

When the consideration of foods and feeding is reached, the pros. and cons. of cooked and uncooked foods will be given and at present it is sufficient to say that meals will give the best results if scalded and fed lukewarm to suckling sows. In addition to meals of any sort, some oilcake or peas is useful in giving a higher albuminoid content to the food, which is necessary since the ratio of milk is high in this respect. Green stuffs, and especially of the leguminous order, should be supplied without restriction other than the sow's capacity, while roots—boiled for preference—are also useful. The secret of producing fine young weaners is to so feed the mother that she will have the maximum of milk-producing food given her without upsetting her organs of nutrition. And if there be any way of effecting this desirable object it is by feeding in small quantities and at frequent intervals. By giving huge feeds once or twice a day one can put a pig off its food very quickly. Charcoal, ashes, and an occasional shovelful of fresh earth should be within reach of the sow.

At a month old the young pigs may be taught to eat by scattering a few peas that have been soaked in water where the pigs can get at them, or a little scalded pollard may be placed beyond reach of the sow but accessible to the little ones. At first they should be permitted to have but little, as the new order of food may disorder the delicate digestions, but gradually the quantity may be increased so long as no evidence is shown of scouring. Where cow's milk is available, there is nothing better for the young pigs, and no amount of grain or cake will enable growth to be made so rapidly as when milk is to be had. Any of the standard foods can be profitably fed the youngsters so long as they will eat it and it agrees with them. They should be taught to clean up all given to them and on no account should food remain in the troughs to turn sour.

Weaning is best performed at 8 weeks or more. The custom of weaning at six weeks and earlier is to be deprecated, and if reasonable treatment has been given, the pigs should average from 40 to

45 lbs. live weight. Weaning is best performed gradually. Remove the mother during the day for a few days, putting her with the pigs during the night; then allow only a couple of the smallest pigs with her for a night or two, and in the meantime put her on short rations of a dry order. With regard to getting the sow in pig again, sows come into season a few days after farrowing, but unless she has had mishaps with her litter, and only has a very few pigs, there is nothing to be gained by allowing service at that time. On the other hand there is decided risk of producing abortion (should she conceive), by the pummelling her suckling litter give her about the ordinary weaning time. It is generally supposed that a sow will not come on heat again until after her pigs are weaned. This may be often the case, but where the sows are liberally fed, and watch is kept, they may be found to take the boar about 6 weeks after farrowing, in which case there is no harm in allowing the pigs to suckle until about 10 weeks old, should the condition of the sow permit. Castration of the young boars should be performed at the age of three or four weeks.

ANOTHER POISON PLANT.

Gastrolobium spinosum.

Mr. H. S. Randford, the Government Land Agent, has forwarded a plant for identification, supposed to be poisonous. The plant was handed to Dr. Morrison, of the Department of Agriculture, who reports as follows: "The plant received is a variety of the prickly poison bush *Gastrolobium spinosum*. Although this species of *Gastrolobium* does not appear to have had its noxious properties so fully and definitely tested, or at least recorded, as some of the other poison plants, there is, nevertheless a general consensus of opinion that it is poisonous, and I do not doubt that it is so. The belief of the oldest settlers at Katanning, as mentioned by Mr. Randford, that it is not poisonous, is prevalent also amongst the old settlers in the Gingin district, but there may be some special reason to account for the absence of a history of poisonous effects on which that belief is founded. It may be, for example, that better and more wholesome food for stock may be abundant in these localities at the season when this plant is young and tender enough to be eaten, while at a later date its foliage is dry and harsh enough to repel the animals from browsing on it. At the same time other poisonous plants in the same neighbourhood may be blamed in cases of poisoning, although in some cases, the prickly poison may really have been the cause." The thanks of the settlers are certainly due to Mr. Randford for drawing attention to this matter. The Editor will be glad to hear from any settlers who may have had any experience of the effect of this plant on animals.

NOXIOUS WEEDS ACT.

One of the most pressing Acts passed last session and one repeatedly asked for by the Producers' Conferences is that intituled "The Noxious Weeds Act, 1900." Immediately on the Royal assent being given to this measure the Department caused the following circular to be issued to the Secretaries of all Municipal Councils and Road Boards.

"I am instructed by the Hon. the Minister presiding over the Department of Agriculture to ask you to draw the immediate attention of your Council or Board to Section 4 of the Noxious Weeds Act, 1900, which reads as follows:—

- '4. The Governor may at any time, on the recommendation of a municipal council, road board, or of the advisory board of the Department of Agriculture, by proclamation published in the *Government Gazette*, declare any plants to be noxious weeds, either generally or in any particular locality, and may from time to time, on the like recommendation, revoke any such declaration.'

By reference to the Schedule you will see that Stinkwort (*Inula graveolens*), Bathurst Burr (*Xanthium spinosum*), Nut-grass (*Cyperus rotundus*) have been declared noxious weeds over the whole of the Colony, and I shall be obliged if you will inform me, on the attached Form 2, at your earliest convenience, if these weeds are known to exist in the district controlled by your Council or Board, and if so, in what particular localities.

I am also directed by the Minister to ask your Council or Board as soon as possible to submit to me (per Form 3 herewith) the names of any plants growing in the district governed by your Council or Board which, in the opinion of the Council or Board, should be declared noxious weeds.

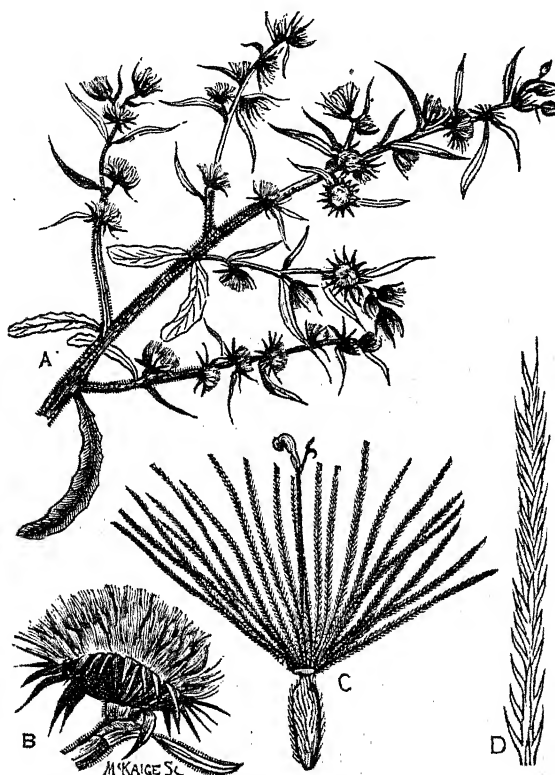
In order to make quite sure that the plant you wish declared a weed is properly named and described, it will be advisable for you to submit specimens to the Department (roots, branches, leaves, and flowers, when possible) for identification by the Government Botanist.

Already a number of replies have been received, and steps are being taken to have an inspection made of infested areas. It is intended to secure the eradication of as much stinkwort as possible this year before the plants seed. It is urged that this plant should be pulled up and burnt whenever seen, every precaution being taken to prevent seeding, it has been known for the seed to grow even after it was thought that it had been destroyed. The plants should not be allowed to either lay on the ground or buried, but in every case destroyed by fire.

The three plants more particularly referred to in the above circular are here produced. It is hoped that readers of the JOURNAL will send in any information they may have with respect to the existence of these or any other noxious plants that may be growing in their districts. The full text of the Act is published in this issue.

STINKWORT.—*Inula graveolens*.

Inula graveolens, the Stinkwort, is a plant of the natural order *Composita*, which is characterised by having numerous florets brought together to form the "heads" usually spoken of as the flowers, though of a composite nature. It is a much-branched annual, growing, under favourable conditions, to a height of several feet. The whole plant is covered with glandular hairs that secrete a disagreeable viscid fluid. The lower leaves are oblong-lanceolate

STINKWORT. (*Inula graveolens*).

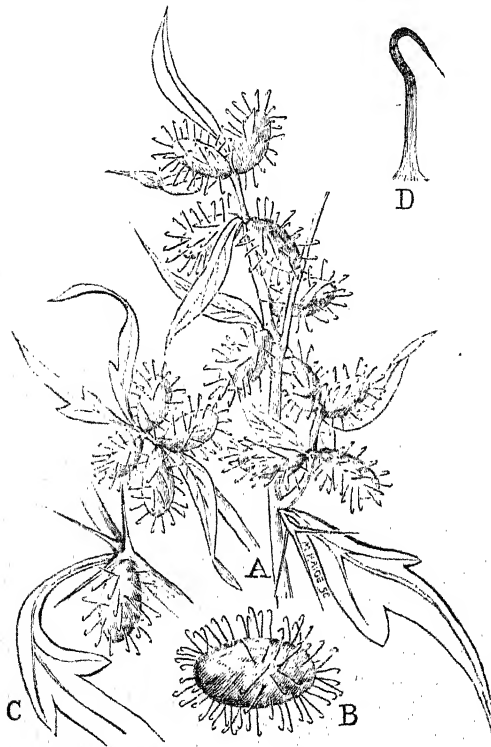
- A. Branchlet, showing flowers. Less than natural size.
- B. Flowerhead. Much enlarged.
- C. Seed, with Pappus attached. Magnified.
- D. Piece of bristle of Pappus, showing shape of Spicules. Magnified.

and imperfectly toothed, while the upper are narrow and shorter. The flowers are situated in the angles between the leaf and branch, and are in small heads that contain a large number of florets, of which those in the outer row are numerous and form a yellow "ray," which, however, does not extend beyond the tips of the more or less green involucre bracts forming the outer covering of the

head. The anthers are joined together to form a sheath round the style, and are provided with very fine tails at the lower end. The small seeds or nuts, formed by each of the florets, are hairy, and bear at their upper end a pappus, or down, of numerous nearly equal barbellate bristles joined together at the base in a ring-like cup, below which the seed is constricted into a short neck. As each plant bears a considerable number of flower heads, each containing many florets, a large quantity of seed is produced, which is quickly shed, and being furnished with down is carried far and wide by the lightest breeze, thereby ensuring its spread over a large area.

BATHURST BURR.—*Xanthium spinosum*.

The genus *Xanthium* is generally placed in the natural order *Compositæ*, which includes, among many others, the thistles and



BATHURST BURR. (*Xanthium spinosum*).

- A Branchlet of plant. Natural size
- B Fruit or Burr, enlarged, containing seed
- C Leaf fruit and spines
- D One of the Hooks on the Burr. Much enlarged.

burdock, but it is an anomolous genus showing some affinities with the nettle and other distant families. The flowers are in heads, as in composites generally, but they are monoecious, the males and females being in separate heads on the same plant. The male flowers are situated at the ends of the branches, while the females are placed lower down in the axils of the leaves, two florets being consolidated with the involneral bracts, so as to form an ovoid or oblong burr, from which the points of the bracts project as small spines with hooked points by means of which the burr attaches itself to wool or similar material.

Xanthium spinosum,
Spiny Burweed, or
Bathurst Burr, is



NUT-GRASS.

(*Cyperus rotundus*.)

- 1 Spikelet. Magnified
- 2 Transverse Section of flower stalk. Magnified
- 3 Transverse Section of leaf. Magnified
- 4 Spikelet Scale or Glume. Magnified
- 5 Fruit not fully ripe. Magnified
- 6 Transverse Section of Seed. Magnified

known from other species by the strong 3-branched spines situated at the base of each leaf stalk. The leaves have a lanceolate blade with two short, more or less distinct, lobes near its base, and are grey and woolly on the under surface. The plant is a rigid annual, and springs up afresh in the cool season wherever the burrs have been deposited, growing to a height of one or two feet. It is apparently of South American origin, and was first introduced into Spain, spreading from there over the countries bordering the Mediterranean, and now found in temperate and warm latitudes all over the world. It was first observed in Australia in 1852, probably at Bathurst in New South Wales, from which town it has derived its Australian name.

NUT-GRASS.—*Cyperus rotundus*.

The Nut-Grass, *Cyperus rotundus*, belongs to the natural order *Cyperaceæ*, or Sedges, which are more readily distinguished from the *Gramineæ* or true grasses by having solid, not hollow, stems, and leaf-sheaths forming a complete tube around the stem, instead of merely clasping it with their edges free. The rushes, or *Juncaceæ*, on the other hand, though showing an outward resemblance, are known by the structure of their flowers, which are more highly developed and provided with a perianth or floral envelope, besides producing a number of seeds in a capsule instead of one only in the form of a small nut.

Cyperus rotundus is an erect plant with a creeping underground stem or rhizome, on which are the tuberous swellings that have suggested the name "Nut-Grass." The stems grow to about 18 inches high, and are three-angled near the top, where the flowers are placed, while the leaves spring from near the root, and are shorter than the stem. The flowers, as in the true grasses, are arranged in spikelets springing in clusters from the summit of the stem. The spikelets are of a rich brown colour, narrow, pointed, and somewhat flattened, and contain a considerable number of little flowers. These are enclosed, as in grasses, within glumes or scales, having a prominent rib on their under side, and consist of only the stamens and pistil, the essential male and female parts, the latter producing the fruit containing a single seed, which is three-angled and less than half the length of the glume. Besides producing seed, the plant propagates itself by means of the "nuts" or tubers, so that in the course of time it forms a dense growth, and takes complete possession of the ground. It grows abundantly in most parts of the world.

PERTH MARKETS.—On the 1st of January the Department of Agriculture took over the entire control of the Perth Markets. This, it is hoped, will bring the producer and consumer into closer touch with each other, and while the producer will get better prices, the public will have cheaper food.

SHEEP AND WOOL.

ANGORAS FOR BRUSH LANDS.

We recently had a Texas man's opinion of Angoras as land cleaners. The goat seems to be reaching eminence in this line. Writers in the *Country Gentleman* furnish interesting suggestions:—

BRUSH BOUNCERS.—The present interest in Angora goats is due chiefly to their merits as brush exterminators. They are likely to become one of the largest stock raising industries on that account, and every progressive farmer should thoroughly investigate the Angora goat. As scavengers their value is inestimable, and in every instance of experiment they have accomplished even more than was expected of them. There is nothing in the way of vegetation that cattle refuse to eat that a goat will not eat with a relish; hence the value of them. A farmer must labor for what he feeds his cows, and ten or twelve goats can live on what it takes to keep one cow. But the best of all is their peculiar appetite for brush. There is no kind of brush known that a goat will not eat if he can get at it, and they are capable of climbing leaning trees and heavy brush with the greatest of ease.

If you desire to kill out young trees or saplings, you can quickly accomplish the task by chopping the tree so that it will fall. It is better to chop part way and then break them down. This leaves the roots connected to some extent with the foliage, and the goats will eat the leaves, which invariably kills the tree, roots and all. Should any sprouts come out in the following spring, the goats will make quick work of their destruction; and so it is with any class of vegetation that they can get at.

BRUSH RANGERS.—Some people say, why is it the goats do not eat out the range in the mountains? Simply because there are not enough goats to the acre. You can have an Angora goat farm and always have brush feed for them every year. But to do so you must have one acre of brush land to every goat. In this way the goats are not sufficient to kill the brush; but put two and a half to three goats to the acre, and you can accomplish an amount of grubbing that is incomprehensible until you see it done. It will no doubt be the means of clearing some of the millions of acres of land that could be cultivated were it not for the heavy growth of underbrush thereon.

FENCE FOR GOATS.—Almost everyone has a mistaken idea about fencing land to hold the goats, some believing that a 5 ft. poultry netting is the least height that will keep them within bounds. It is true they are very agile, and when scared will sometimes clear a 3 ft. fence with ease. A fence 4 ft. high will keep them in perfectly, but the great trouble with barbed wire and board fences is that the goats will crawl through or under the fence. The best fence is a strand of 21 in. hog wire and four strands of barbed

wire, the top wire being 4 ft. from the ground. This kind of a fence will be sufficient to hold your goats securely, and as long as you want them.

Angoras, as well as sheep, can be kept year in and year out, day and night, and do better than under the best herder. They are entirely at their ease, they will grow larger and fatter, and bear more mohair or wool than in any other way, and pay for the full cost of the fence in a very few years. Of course, they would need sheds to protect them against rain. Should part of such mountain brush land have to be reserved for a larger growth, it should be partitioned off until large enough to have hard and rough bark. Then some good woodsman could cut off with the axe or brush hook the smaller ones, and the goats will then only touch the young shoots, as long as there are enough of them to feed on. In this way they would rather be an advantage than a detriment to forest growth, as they would keep the woodlands clean and less exposed to damage by fires.

The number of Angoras which can be kept on an acre varies with the size, character and density of the brush, and may vary from four or five acres to each Angora goat to eight and ten Angoras for each acre, and can only be determined by actual experiments.

Though not nearly as many can be kept to the acre, they really do best in well-protected forests, with small undergrowth, and it is on such land that they reach their highest perfection in Asia Minor.—*Pacific Rural Press*.

NATIONAL SHOW.

Arrangements have been made for holding the National Show in the Queen's Hall on March 6, 7, 8, 9; entries are now coming in, and a large display is expected. Secretaries of all societies are notified that all detailed entries and applications for space must be in the hands of the Secretary, Department of Agriculture, not later than February 1st, so as to enable arrangements to be made as to space. All those wishing to send perishable exhibits can have the same kept in the cool stores until show time; entry forms and labels for this purpose can be obtained on application. Manufacturers and others wishing to exhibit must make application and send in details before February 1st. Mr. P. Wicken, an officer of the Department, is now making a tour of the agricultural districts and working up matters in connection with this show.

It is sincerely hoped that all those who have anything worth exhibiting will send it forward for this occasion, as it is hoped to make a great show of agricultural produce so as to show what can be grown in the colony, and thereby to stimulate local production and manufacturers.

DISEASED PASSION FRUIT.

A serious shrinkage was last year reported in the passion fruit crop of the districts around Sydney. The disease—if the occurrence is really due to a disease—is locally known as “ironbark” fruit, and the alarm so wide-spread that the Department of Agriculture directed an investigation in the matter by the Government Fruit Expert (Mr. W. J. Allen), and called for a report, which was duly presented.

Mr. Allen visited the plantations of different growers of the passion fruit vine in and around Dural, Galston, Arcadia, Glenore, and Kenthurst, in order to arrive at some conclusion as to the cause of the deformed fruit. The disease, the report says, is characterised by a thickening and hardening of the rind to such an extent that it more resembles a smooth bark than anything else. Only a small proportion of the fruit develops properly, most of it being undersized, ill-shapen, contorted, and with little or no pulp. The disease makes its appearance soon after the fruit has set, and can be easily distinguished then; the vines also showing its effects by an improperly developed appearance, the leaves being small. In many of the vineyards an occasional vine is found dying from the effects of a disease resembling very much the disease known as *Mal di Goma* (collar rot) which attacks the citrus trees just above the surface of the ground.

Mr. Allen states he has been unable to trace this ironbark disease to any one source, but is of opinion that a multiplicity of causes are accountable for the falling off of some of the vineyards, chief among which are:—

- (1.) Planting in exposed position, where the vines are subject to high winds.
- (2.) Frosts and cold weather during winter and at time of blooming.
- (3.) Heavy, cold and poor soils and sub-soils.
- (4.) Improper fertilizers, or neglect to supply sufficient, if any.
- (5.) Insufficient moisture owing to hot, dry summers.
- (6.) Not selecting soils and position most suitable to the passion vine.
- (7.) Age of vines.
- (8.) A fungoid disease.

The investigator goes on reviewing each one of these causes separately. From the evidence produced, however, it would seem that Mr. Allen is emphasising too much the possible causes of the disease due to aspect, want of fertility and of moisture, and is passing somewhat lightly over the more probable cause: the one due to fungoid disease. However, the trouble is being investigated, and more light will no doubt shortly be thrown over it. In the mean time, as the Government Pomologist suggests, growers would be wise to mature their passion fruit vineyard, cultivate them and give them such care and attention required by their healthy growth.

RECLAMATION OF SAND DOWNS AT CHAMPION BAY.

The problem of staying the incursion of sand downs along the coast of Western Australia is one which in places has been grappled with a greater or lesser amount of success. In two localities the efforts of those who have set themselves that task has been rewarded with success. Mr. M. C. Davies at Karridale, with the aid of marram grass, has bound together what once were waves of rolling sand, and since, at Geraldton, the R.M., Mr. Maitland Brown, and in conjunction with him the town council, have been successful in consolidating the sand downs which threatened to obliterate one portion of the town of Geraldton.

The illustrations reproduced in this issue are from photographs taken by Mr. Howard H. Evans, architect, Geraldton, they show how, by covering the sand with brush, the couch has been induced to grow and has since taken a firm hold of the sand.

To the courtesy of Mr. Maitland Brown we owe the following report from the officer, who, under his direction, carried out this work of reclamation. On the part of the same hill under the jurisdiction of the town council, the brush covering was not so thoroughly applied to the sand downs, and the couch in consequence seems to be slower in covering the moving sand. The report runs as follows :

Geraldton Gaol,

August 29th, 1900.

To the Government Resident.

Sir,—I beg to report to you *re* couch-grassing Flagstaff Hill. I had the prison party there fifteen (15) days levelling off bumps of sand and putting in couch grass, the grass was all planted by September 2nd, 1899. The grass is put in in rows or trenches 15 inches apart, each trench is about 6 inches deep, the grass is then placed in the trench, not very thick, about 3 or 4 runners or roots right along, there must be grass all along the bottom of the trench from end to end, it is then covered over so that no grass is visible. The grass is usually planted same day as it is dug, unless buried in a damp place so it is not exposed to sun or wind, the ground is then covered by bush to prevent drift.

I have the honor to be, Sir,

Your obedient servant,

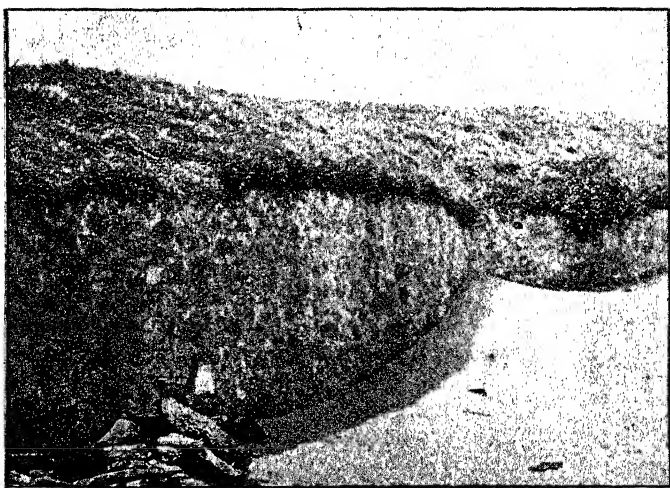
A. T. BADGER,

Warder.

FRUIT FLY.—It is stated that the Fruit Fly has been seen in the Swan district. Fruitgrowers and others are urged to inform the Department at once, should they come across any of these pests.



SAND DRIFT BLOWN AWAY FROM ROOTS OF TREE, NOW COMPLETELY STOPPED.



WALL, BACK OF POLICE QUARTERS, SHOWING SAND DRIFT COMPLETELY STOPPED, GRASS GROWING DOWN SIDE OF WALL.

(See Reclamation of Sand Downs, page 88.)

POULTRY ON THE FARM.

BY MR. A. CRAWFORD.

If a foster mother is used for rearing of chickens, its position should be frequently changed, so that fresh run may be given. If the run is a small one the chickens should not be allowed to run on it for more than a week at a time, as it soon gets foul. Although when mature, poultry can stand a good deal of improper treatment, in their chickenhood it does not take much to kill them. The inside of the foster mother should be cleaned out daily and fresh sand sprinkled over it. At frequent intervals the whole interior should be well sprayed or washed with a ten per cent. carbolic acid solution, or of Phenyll, to kill all lice, etc., that may gather. As a rule chickens can stand any amount of cold so long as they are kept dry, but even the hardiest breeds rapidly succumb to damp. In fact, scarcely anything will cause chickens to die off quicker than having their camping place damp. In foster mothers that have been used for two or three years there is frequently a leak that, although small and perhaps not very noticeable, yet is sufficient to do a great amount of damage. A sharp look out should be kept for such. If an iron tank is used in the foster mother it will rarely go through the third season without leaking, and then it will be necessary to have a new tank put in. In such case it will pay to get a copper one, the extra cost will not be more than a pound or thirty shillings, and it will last a life time. In purchasing either an incubator or foster mother a copper tank should always be insisted on and with any ordinary usage it will last fifteen or twenty years without fear of leakage. At about eight weeks old the chickens may be removed from the mother and put into pens, with roosts about two feet from the ground. If they do not take to the roosting at once if they are set on the roosts at night they will generally go back ever after.

Now that the chickens have grown and got over the early and more delicate stage of their existence, they should by no means be neglected, feeding at least three or four times a day should be continued, and a good supply of green food. Above all things if you want good health give plenty of sharp grit. When I say sharp grit I mean grit that has sharp edges and corners like broken up crockery. I am inclined to think that the want of proper grit is the cause of at least three-fourths of the disease that we have, and it cannot be too strongly urged upon all farmers, show breeders, and private poultry keepers to give

SHARP GRIT.

By feeding well the rapid growth of the chickens is ensured, they grow to be good specimens of their breed and if they are required for show purposes this is most important in all breeds except Bantams. If not wanted for show the cockerels are the sooner ready for the table and the earlier the pullets will start laying.

As soon as there is a marked distinction between the sexes the cockerels should be separated from the pullets, and if it is desired to go in for egg production for market only, the pullets should be kept without any male birds running with them. It is claimed that pullets, when thus kept, lay about ten per cent. more eggs. The egg also will keep much longer fresh. If it is convenient to keep the sexes separate and it is not desirable to sell off at once the cockerels, the best way is to caponise them. The process is not difficult with proper instruments, which can be had at 20s. per set. The cockerels thus treated can be allowed to run with the other poultry and will not fight, but will lay on flesh freely and be much more tender for the table. A suitable age for caponising is about three to three-and-a-half months old.

BOOK-KEEPING ON THE FARM.

During the last year this JOURNAL has repeatedly urged the necessity of a proper system of Book-keeping being done on all farms. The London *Graphic* in a recent issue also speaks strongly on this matter as follows:—"A visit to a modern farm always has, at least, one surprise in store for us, and that is the clerical work involved. Farmers who have lived, prospered, and left money running well into five figures have to our knowledge kept no accounts beyond those which the makers of small pocket diaries provide for at the end of the diary proper. These days, however, seem to be over, and doubtless the excessive dependence on what one man of exceptional ability could 'carry in his head' was the cause why so many successful farmers in the past were succeeded by unsuccessful sons. The modern system provides for continuity; the old did not. To-day the daily yield of milk from each cow is noted, the yield of corn, straw, &c., from each field. The averages are made up at frequent intervals, the losses from death on a large number of farm animals are subdivided into those caused by accident, by disease, and by birth of young. Here again averages soon become available, and by reference to a book like the last edition of *Stephen's Book of the Farm* the farmer can learn whether he is holding his own with his brethren or not. The farmer still resents for the most part this new task, but the employment of a commercial clerk is thoroughly justified on any large farm, and he will be kept busy, too. The really able man will probably find the new system reduce his earnings. In thirty years a clerk's salary, with interest, would eat up from four to five thousand pounds. But instead of feeling that his own death would probably reduce his family from affluence to difficulty the new type of large farmer will know that he is handing over 'a going concern,' which any diligent chief of the most moderate brains can keep running."

FRUIT GROWING IN THE EASTERN STATES.

Mr. J. Cramer, foreman for Mr. C. Harper, Woodbridge, has recently returned from a tour around Victoria and South Australia, where he has spent some few weeks in looking through the orchards and vineyards in those colonies, with the hope of getting useful experience and of obtaining new varieties of fruit. He first visited Gembrook, on the outskirts of Gippsland, Victoria. The natural country is very heavily timbered, notwithstanding which the soil is rather poor; the principal fruits grown are raspberries, strawberries and other small fruits. Apples, pears, and peaches do well, but owing to the cold climate all fungus diseases, such as Black Spot, Peach Leaf Curl, etc., are very bad. Large pear trees loaded with a heavy crop had every pear deformed with the Black Spot, and the growers said they would not have a marketable fruit on all the trees.

He then visited Arthur's Creek, which is famous for apples, peaches and deciduous fruits; there were hundreds of acres of peach trees without a leaf, owing to the attacks of the Aphis and Peach Leaf Curl. This is also a cold wet climate, and favorable to the growth of these diseases. A noticeable fact was, that where new trees had been planted they made splendid growth, and were remarkably healthy and clean for the first few years, and after that they were attacked by the fungus diseases from the adjoining orchards.

The next place visited was Whittlesea, and there he saw the finest orchards in the district. A few years ago this district was devoted entirely to dairying, but is now being largely planted out with orchards; so far only the peach trees have been attacked by disease, and are now being grubbed out, and the settlers are going in exclusively for apples, pears and plums. Mr T. Nicholson, the planter of the first orchard in this district, has gone the right way to work; the land was thoroughly cultivated, the trees properly planted and sprayed continually, and when marketing fruit he scalded all cases received from Melbourne to prevent the spread of Codlin Moth and other diseases. His orchard is now in a flourishing condition and a credit to the country. The later settlers have very largely followed the good example set them.

The most up-to-date place visited was Mooroopna in the Goulburn Valley district, and he was pleased to see that Woodbridge compared favourably with the orchards in this part. The first settler was Mr. West, the late Government Fruit Expert in Victoria, who is the father of this settlement. The soil and climate are admirably adapted for fruit growing, and in addition to this they have a splendid irrigation system. They have just the same diseases here as in the cooler districts, but the climate is similar to our own, and the fungus diseases do not make much headway. The growers are fully seized with the importance of keeping their orchards clean, and they carry it out to the letter. Their worst pests are the Codlin Moth, Root-Borer, and Phylloxera.

Mr. Cramer visited all the principal orchards in the Ardmona Fruit Colony, and they much reminded him of W.A., the people all doing their best to keep down the insect pests. Although all the common insect pests are present in this district, the growers take such steps to keep them down that they are hardly noticeable.

He next visited South Australia, and was surprised to find they were much behind this colony in their fruit growing, but are much ahead of us in their vineyards and wine-making business. Notwithstanding the heavy duty on wine in this colony, the South Australian growers are doing a big wine business with Western Australia. He visited all the principal vineyards and cellars around Adelaide, and was much impressed with what he saw. One firm, Messrs. T. Hardy & Son, of Bankside, have been trying experiments with our West Australian timbers—Jarrah and Karri—and are favourably disposed towards the vats made from our Jarrah timber, but the Karri was not so satisfactory. Mr. Hardy expressed a hope that before long he would turn out all his wine in Jarrah casks. He has been importing quantities of Jarrah for years past, as it is necessary that the timber should be well seasoned before using it.

Mr. Cramer's object in visiting the other colonies was to obtain a number of new varieties of fruits; he secured all the latest varieties of apples, pears, peaches, plums and loquats, and will give them a thorough test at Woodbridge, and if they are suitable to this climate he will propagate them.

It was very noticeable that the growers in the other colonies were to all intents and purposes taking pattern by Western Australia; they are doing things now that we have been doing for years past in the way of cutting down their old trees and unprofitable varieties and grafting them with the better kinds. The same with insect pests, they are now trying to take combined action to suppress these, which we have been compelled by the Department of Agriculture to do for years past. Mr. Cramer felt quite elated while walking through the orchards at the thought of how clean our orchards were, and how favourably they compared with any of those he visited.

BUSH FIRES.

PERCY G. WICKEN.

The dry season is now at hand again; as usual we are hearing of the great loss of property caused by the disastrous bush fires which at this time of the year are so easily started, and everything being so dry, the fire travels along the ground, before the wind, at almost incredible speed, consuming all that comes in its way. In some cases, especially in unoccupied land where there are no fences or property to destroy, a bush fire may be beneficial by clearing the ground from all leaves, rubbish, killing vermin and

sweetening the land, but in cultivated and lightly grassed country, a bush fire, once started, proves to be one of the most disastrous events that can occur, often defying all efforts to stop its progress, and meaning ruin and desolation to all who may be in its path. After months of toil, and just as the crops are beginning to assume the pleasant yellow appearance denoting the arrival of harvest time, and the farmer is congratulating himself on having survived the attacks of his insect enemies, the drought fiend, and his other troubles, and is beginning to think what he will do with that small bank balance which, in his mind's eye, he sees opposite his name in the ledgers of the local bank, and that, for a time at all events, his financial troubles are over. While thinking over these pleasant subjects he looks up and sees a small column of smoke ascending in the distance, which rapidly increasing in volume, informs him that a bush fire is bearing down upon him; he immediately proceeds to the scene and there finds his neighbours bound on the same errand as himself.

Then begins the same old struggle, the fire racing before the wind, the settlers from all parts, with bushes, old bags, raw hides, or anything that comes to hand, trying to beat out or turn the direction of the fire. After some hours of this hard work, the settler, half blinded by heat and smoke, with sore eyes and parched throat, either has the pleasure of seeing the fire turned off in some one else's direction, or of contemplating the blackened remains of his crop, which in the morning looked so promising, and possibly of his home and buildings. If at this time the man breaks out into sentences and expressions which, to say the least, are not considered gentlemanly, well, who is to pronounce judgment on him?

Towards the end of our summer, when everything is completely dried up, the condition of the grass and undergrowth, is just like tinder, and the least spark of fire is likely to start a big blaze, I have seen a match thrown down by a man lighting his pipe on horseback start a fire so quickly that before he could pull up, get down and stamp it out, the fire had got beyond his power to check it. Apart from the fires caused along the railway lines by the engines, the principle causes of bush fires are the careless use of matches while smoking, sparks from pipes, and fires lighted in the bush by travellers to cook their food, etc., and which are left burning, instead of being put out when finished with.

Under the Bush Fires Act, the burning off of timber felled in clearing the bush is prohibited from September to March, the dates slightly vary in different districts, and Section 7 of the Act reads as follows:—

“Every person who shall wilfully or negligently set fire to the bush within any district or part of the colony during the prohibited time for that district or part, shall be liable on conviction thereof before any two or more Justices of the Peace, to a penalty not exceeding £50. Provided that any lawful occupier of land may set fire to the bush on the land in his occupation, if he shall have previously given to all occupiers of the lands next adjacent to his said land, not

less than seven days before he shall set fire to the bush as aforesaid, a notice in writing that he intends to set fire to the bush on the land in his occupation on some day or days between the seventh day and the fourteenth day after giving the said notice as aforesaid, and he shall also take all such precautions as shall prevent the fire from extending to any of the lands adjacent, or from damaging the crops, grass, trees, houses or buildings, on any of the adjacent lands."

It will be seen by this that every precaution is taken by law to prevent people from setting fire to the bush, but when fires occur through the careless use of fire by travellers and swagmen, it is very hard for the police to put their hands on the offenders, and harder still for them to obtain sufficient evidence to convict them if arrested.

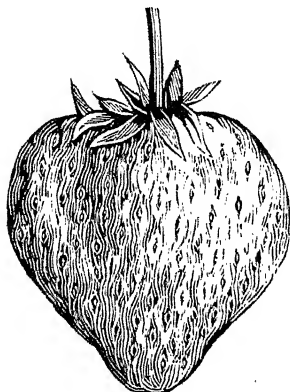
When once a bush fire is fairly started very little can be done in the way of putting it out, and all energies should be directed towards turning it in the direction of the nearest fire break, or towards where it is likely to do the least harm.

This can only be done by burning back against the fire in strips, and by beating it out with green bushes, wet bags, or anything handy, a very good fire beater can be made by firmly securing a piece of raw hide about 3 ft. long by 2 ft. broad, to a stout piece of sapling about 6 ft. long. This will last for a long time, as it will not burn, and as it is fairly heavy it is of great use in beating out a fire.

In the case of bush fires prevention is better than cure, and all settlers should turn their attention to make fire breakers on all sides of their property that are likely to be attacked. This may easily be done by ploughing a strip of land round all fences and cultivated crops which, being kept free from grass, will act as a check against, and generally prevent it from spreading, if this were made compulsory by law it would do much to prevent the spread of fires. Much might also be done by Road Boards and the railway authorities by burning off the sides of the roads and railway lines, and destroying all grass and rubbish by a fixed date each season. All cleared roads may be made important checks for fire by being kept clear of rubbish. A good idea is to run, by means of horse, a light harrow, a sheet of iron, or a big bush along on each side of the road; this will flatten the grass down, and will be a great help to the workers, who, when the fire reached a road which had been treated in this manner, would be in a much better position to beat it out. In conclusion the writer can only advise everybody to be as careful as possible in the use of fire and matches, and to take every precaution which may suggest itself to them to prevent the spread of fire. In travelling through the country we find very few precautions taken to prevent fire from spreading, but if the settlers would combine together, and each one do the best they could to prevent fire from spreading, they would greatly minimise the evil results. Although there may be no hopes of absolutely preventing bush fires, if everyone kept their headlands and around their fences clear they would not have so much occasion to dread a bush fire.

THE NOBLE STRAWBERRY.

A valuable early English variety. Plant hardy, with large leaves, prolific. Fruit large, roundish, dark glossy red; flesh firm, solid, dark salmon color; ripens early to mid-season, together with



The Noble.

Paxton. Carries well. A very promising strawberry. The illustration is from a specimen grown by Mr. A. Wheelwright, at Gooseberry Hill.

THE RABBIT INVASION.

The urgency of dealing with the threatened invasion of rabbits from the East has formed the subject of debate at all the Producers' Conferences which have been held, and in April of last year the following resolution was agreed to:—"That this Conference considers immediate steps should be taken by the Government to place a fence so as to stop the rabbits from invading settled portions of the colony." The outcome of this resolution was the calling for a report from the Chief Inspector of Stock who dealt fully with the matter, the report being published at the time.

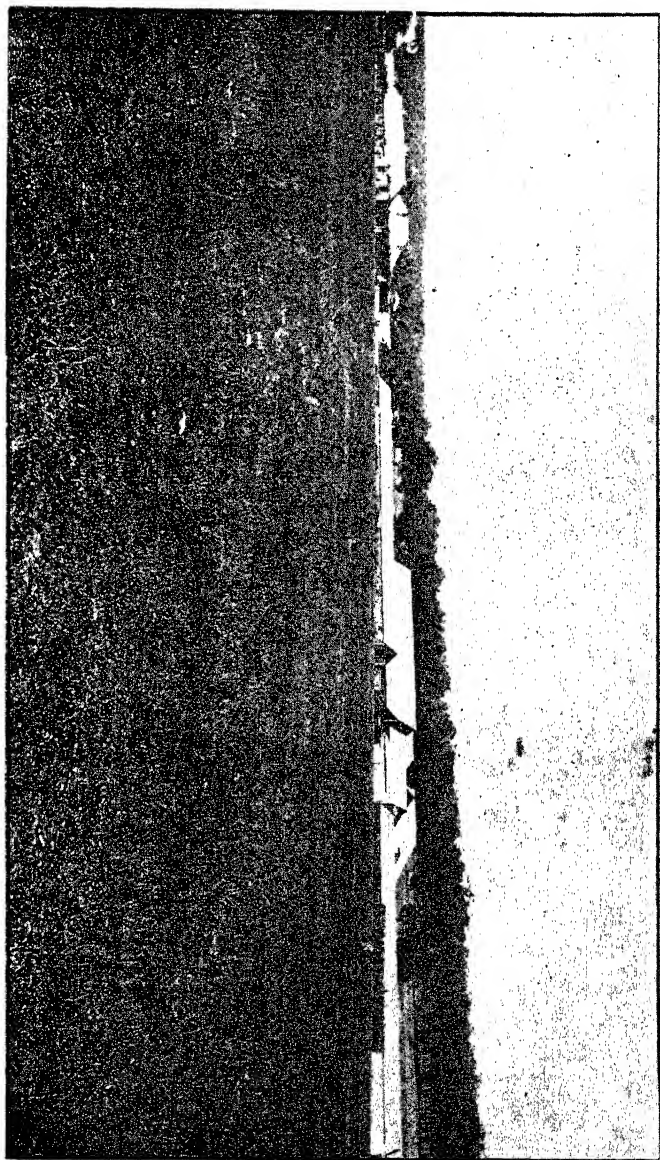
On the 28th of last month the question of rabbit invasion was again brought under the notice of the Government by a large and influential deputation representing the pastoral, agricultural, and banking interests, which waited on the Acting-Premier, Mr. George Throssell, on December 28th, and asked that the Government should at once adopt more determined efforts to cope with the pest by the construction of some two hundred miles of rabbit-proof fence from a point about sixty or seventy miles south of Boorabbin, thence north to Boorabbin, and north-east to Goongarrie and Edjudina, at an estimated cost of about £20,000. There were about fifty representative gentlemen present on the deputation.

The Acting-Premier promised to give the wishes of the deputation his early attention. Scouting parties are now out in search of any stray rabbits.

INSPECTOR'S REPORT.

The Minister of Lands has received the following report from Inspector Fry on his work for the month :—"At Carnamah I visited Macpherson Bros. C.P. of 500 acres, situated about one mile east of the Yarra Yarra Lake, where I noticed very superior improvements had been carried out. The land consists principally of salmon gum country, the whole of which has been ring-barked, and fifty acres are under crop. This crop is by far the best I have seen in the locality, and, I estimate, should give a return of two tons to the acre. This land gives a splendid illustration of what the salmon gum land will produce. Thousands of acres of similar nature, belonging to the Midland Company, to the south and east are awaiting the settler, but at present it is locked up under the present policy of that conservative Company. I next proceeded to Arrino, inspecting land of new application. There is some very good agricultural land, which would no doubt have been taken up long before this but for the scarcity of water. I advise intending selectors to have a look round this country, as the land is good, and I feel sure that good water could be obtained by deep sinking. From Arrino I travelled down to Moora and out west to Hill River, 'the country of wild horses.' The country is highly suitable for horse-breeding and should be essentially the locality for the production of mules. On passing through old settled country I observed that Mr. Clinch, at Joyce's Flat, and Mr. Drummond, at Yerri Yerri, have both planted from 10 to 12 acres of fig trees, for the purpose of fattening pigs when the trees mature, thus following the example of Mr. Roberts, of Yatheroo, who was the pioneer in growing figs for pig fattening. All over the Dandaragan and Hill River country the Yatheroo oats are still in strong evidence. These oats were introduced many years ago by Mr. Roberts. Mr. Drummond, at Yerri Yerri, has several large paddocks which produce little else but Yatheroo oats. They are splendid feed for fattening cattle, but appear to be deteriorating in growth, and will eventually become exhausted and die out. In this district there are few, if any, noxious weeds, although patches of lupins have this season made their appearance. They are, however, being quickly eradicated. Mr. W. Padbury, in a letter recently published in the *West Australian*, seems to advocate them as useful herbs for ensilage and green manure. In the northern parts of my district, between Strawberry and Northampton, the lupins are not looked upon with favour at all. They are not only taking possession of all the good land, but they flourish in the scrubby timber and stony land, in which kind of country it is impossible to make use of them or get rid of them without much expense."

GENERAL VIEW OF "YATHEROO," MR. ROBERTS' HOMESTEAD.



PICKING AND PACKING FRUIT.

BY A. DESPEISSIS.

The following notes have no other pretension than to offer about picking and packing fruit a few seasonable hints which it is hoped will prove of use to growers.

The picking, curing and packing of lemons and of oranges will be dealt with in the course of a special paper in the February or March issue of this JOURNAL. It was hoped to have for the following notes some explanatory illustrations prepared, but this it has not been found possible to do for this issue, and the whole question will therefore be dealt with over again, and more at length, at some later season.

HOW AND WHEN TO PICK

varies greatly with the fruit it is proposed to handle. Some fruit will not ripen after picking and never become sweeter than when taken from the tree. Figs, for instance, and grapes should be picked when ripe, as unlike bananas, tomatoes, pears, persimons, they do not improve in flavour or become sweeter for keeping.

Fruit meant to be consumed locally may with advantage be left on the trees a day or two longer than the same intended for long shipment. Soft fruit such as cherries, strawberries, plums are not touched by the hand, but their pedicel or stem should be snipped between the finger and thumb, and in strawberries the hull or "nibs" should not be removed. Pears and apples are generally fit to pick when, by lifting them gently from the spur they are attached to, they drop into the palm of the hand. Figs should be ripe and sweet. As they do not all ripen at one time, the trees must be gone over almost every day. Figs intended for eating fresh and marketing, may with advantage be picked a day in advance of the same fruit intended for drying. A fully ripe fig is soft to the touch, it hangs down by the neck and its jacket is more or less cracked, showing white longitudinal seams; they should never be shaken from the trees or possibly bruised by pulling, lest they should sour, in which case they do not keep, and if dried, a few such figs would depreciate the value of a whole box. If within reach, they should be lifted gently when the stalk will tear from the branch, or better, they should be neatly cut. For higher trees, and when the figs are out of reach, a "fig-cutter" is used with advantage. It consists of a fork fastened on a light pole or stick; across that fork is fastened a sharp strip of tin plate or light piece of hoop-iron; below is a small bag made of cheese-cloth, kept open by a wire, or as a substitute some use a simple jam tin. The higher figs are thus reached by means of the pole, severed from the branch by the tin plate and caught in the bag below, without bruise or blemish. When picked at the right time, figs of the proper sorts for drying contain about 35 per cent., and when dry over one half of their weight of sugar.

if in selling a large parcel of fruit, one or two cases, picked out indiscriminately, are used as samples, the contents emptied and exposed to view, and on the sample the whole consignment sold.

For long distance shipping, it stands to reason that nothing but first class fruit will pay for freight and other charges, for packing and for natural waste. Last season the Department of Agriculture consigned to the Agent-General for Western Australia, in London, fortnightly shipments of grapes, apples, pears, oranges and lemons. In order that the grower should derive from the experiments the lesson they were intended to convey, the cases were in no way interfered with and on reaching the Department were merely branded and consigned by mail steamer, and the London fruit broker's reports duly published on their receipt from the Agent-General.

From these reports the following remarks are picked out:—The fruit, as a rule, opened in London in excellent condition, and for beauty of color, flavour and quality, were pronounced by Messrs. Keeling and Hunt to be in every respect suitable for the English market. The grapes, packed in cork grit, did not carry so well, but unsuitable varieties were shipped, as the better carriers, such as the Almeria, could not be got at the time. Muscatels, Doradillo and Wortley Hall were the kinds sent. Some of the cases were reported to be "slack" and contain a large proportion of bunches with loose berries.

With greater facilities for direct shipping from the port of Fremantle, the experiment gives every prospect of seeing the better carrying grapes successfully landed in London, while with a rapid and regular steamship service Colombo and Singapore should absorb large quantities of grapes grown on Western Australian vineyards.

Pears, the fruit brokers report, had seldom or never yet been successfully shipped from Australia, whereas the Napoleon variety from our orchards arrived in a condition such as ensures the possibilities of a large trade being done in that fruit.

Oranges and lemons will be referred to later on, when dealing with the packing and carrying of citrus fruit.

The apples sent attracted a great deal of attention from the horticultural press in England, and were spoken of in terms of the highest praise by all who viewed the shipments and tasted the fruit. The varieties sent were Cleopatra, Rome Beauty, Dunn's Seedling, Jonathan, Kentucky Red Streak, Stencil, Scarlet Nonpareil, Stone Pippin, Northern Spy—all apples suitable for the export market. Some of the cases, however, were indifferently graded and "slack packed," a defect of packing which in the eyes of dealers is as damaging as careless grading. Such fruit, although originally first class, sold as second grade. Those cases should have been packed very

snug in cases with the cleats not too far apart, so as not to cut the fruit when pressed down. Each apple of even size, picked before it is fully ripe and a greasy look over it, should have been wrapped in soft paper, 10 to 12 inches square, white in color and fairly tough of texture. The apples should be put in carefully and firmly, and built up to an inch or so above the case; the cover is then pressed and nailed down. There is enough springiness in the paper to take up the slack, and apples thus packed will not rattle. The Tasmanians—who after years of trial, attended with alternate success and fiasco, have now firmly established a large and a growing export of apples—exercise the utmost care in handling the cases. A few occasionally get somewhat jarred, but they are at once put aside and re-sorted, for one damaged case put up by auction at Covent Garden, often injures the sale of a large parcel. It is not uncommon for one steamer to take on board 10 to 12,000 cases, which one and all are most gently handled. The shippers have their representatives present to see that everything is properly done. The cases of apples are lowered from the stacks awaiting shipment, on to trolleys, then lifted on to the shoots down which they smoothly slide into the hold of the vessel. There the men receiving them, working under supervision, carefully stack them, and thus the whole operation of shipping goes on expeditiously and smoothly.

COLD STORAGE FOR FRUIT.

constitutes at the present time one of the safest and cheapest methods of dealing with fruit at times of glut of the market. It is often with fruit and other perishable produce, either a feast or a famine, but with more precise knowledge regarding methods of picking and packing, and also of cold storage, which private as well as public commercial enterprise has placed within the reach of all, it is now practicable to withhold fruit from the market when it is most abundant and prices are low, and deal it out with profit when it becomes scarce.

The profits, however, are not so large as they would appear to some, and there are risks to face and cost to incur, in holding a crop over. The fruit may, for instance, be of such a kind that nothing will prevent it from deteriorating speedily. Most summer apples, it is well known, will soon, however carefully handled, go mealy and rot; most grapes are bad keepers; strawberries will never keep more than a few hours, or a couple of days at most; then, again, the fruit may not keep well although the variety itself is known to be a good keeper; even if it does keep well there is always a greater or lesser percentage of waste to reckon on; to the loss under this head must be added cost of handling, re-sorting, and re-packing, rent of cold storage room, and the profits to the grower or the dealer are soon greatly reduced. The conditions required for preserving fruit in cold storage are pure, dry, cold air, and the

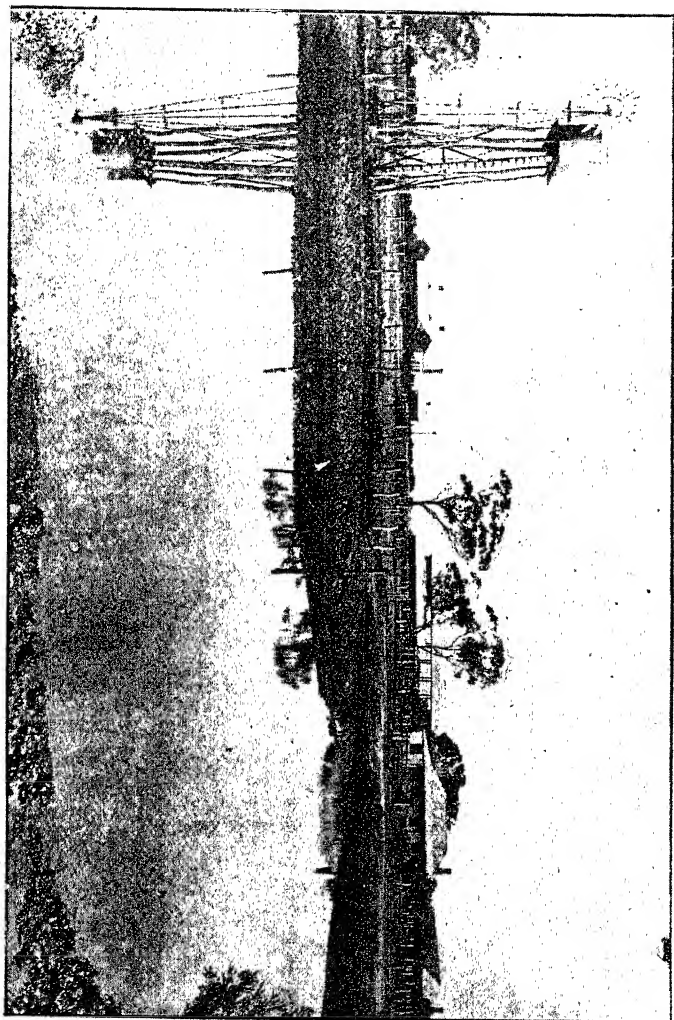
following table, issued by an American Experimental Station, shows the temperatures which, for certain products, gives the best results:—

Product.	Temp., F.	Package.	Keeping period.
Apples, summer	... 38 to 42 ...	boxes	2 to 4 months
Apples, winter	... 32 „ 35 ...	„	5 „ 8 „
Pears	... 33 „ 38 ...	„	2 „ 4 „
Quinces	... 33 „ 35 ...	„	3 „ 4 „
Peaches or Plums	... 36 „ 40 ...	crates	2 „ 4 weeks
Grapes	... 38 „ 40 ...	boxes	2 „ 8 „
Berries, Cherries	... 40 ...	quart bxs.	1 „ 3 „
Lemons, Oranges	... 40 ...	boxes	8 „ 12 „
Water Melons	... 40 ...	„	3 „ 6 „
Musk Melons	... 40 ...	„	2 „ 3 „
Tomatoes	... 38 „ 40 ...	crates	2 „ 4 „
Cucumbers	... 38 „ 40 ...	„	1 „ 3 „
Celery	... 35		
Onions	... 34 „ 40		
Potatoes	... 36 „ 40		
Asparagus & Cabbage	34		

The value of cold storage for juicy summer fruit is not so much for keeping them for any great length of time, as for tiding them over a glutted market. Some fruit, such as strawberries and raspberries, should not be kept over a day or two. Grapes do not retain their flavor, bloom and appearance if kept longer than a week or two. Of pears, some will keep well, others, such as the Bartlett may be put in in the early autumn, and stowed away in such a manner as will allow the cold air to circulate freely around them, they should be sold as soon as the market is relieved, there is always a good demand for them. Late peaches, firm and sweet, may be stored with profit. Apples, of all fruit, keep best, and improve by keeping in cold storage, but whatever fruit is stored success will depend on the kind and condition of the fruit when gathered, the care in handling, packing, the method of storing, as well as the temperature at which it is kept. Two other conditions influence the keeping quality of fruit to a larger extent than most people imagine, one is the quality and amount of fertilising nutriment the tree draws from the earth during the period of its growth, and the other its freedom from parasitic attacks, the nature of the blight affecting it, and its state of health generally.

FINE POTATOES.

The Department of Agriculture has received some very fine specimens of potatoes grown by Mr. A. R. Richardson, Lowlands. They average over one pound weight each, and measure from eight to nine inches long, and from seven to ten inches in circumference. They may be seen at any time in the museum of the Department.



GENERAL VIEW OF MR. PADBURY'S HOMESTEAD, "KOOJAN."

PERTH CITY MARKETS.

The control of the Perth City Markets has been transferred from the Public Works Department to the Department of Agriculture. When the markets were first projected it was the desire of the then Minister of Public Works (Mr. F. H. Piessé) that the Department of Agriculture should have control, but it was eventually decided that the markets should be leased to the City Council. A few months ago, the arrangement not having been altogether satisfactory, the Government resumed the lease, the Council in the meantime having sub-let the premises to Mr. W. J. Kiffin Thomas. It is the desire of the Minister for Lands, who presides over the Department of Agriculture, in taking over the responsibilities of these markets, to bring the producer and the consumer into closer touch. It must be understood, however, that there is no desire on the part of the Minister to break the terms of the lease, and so long as its tenure exists, everything will depend upon Mr. Thomas. The department now controlling the markets (subject to the terms of the lease) will make every endeavour to induce the lessee and the Municipal authorities to act in such a manner as to bring the markets more into line with those of the Eastern States, and to insure purer and cheaper food to the public. It is necessary to add that Mr. Thomas is most anxious to aid the Department of Agriculture in every way in its object in making the markets of such a nature that the producer may enjoy that intimate touch with the consumer which must in the end contribute largely to a reduction of the cost of living.

In referring to the question in his annual report of September last, the Secretary of the Department of Agriculture said:—

Having assumed control of the Refrigerating Works, I regret—and more particularly so in the interests of both producers and consumers alike—there is not a public market in Perth. There is, I am given to understand, a market leased by the Government to the Municipal Council, but it does not by any means fulfil the functions of a public market, in so far as reducing the cost of produce to the consumer is concerned. There is no necessity for a retail market in Perth—shops of all sorts are plentiful enough—but there is an urgent necessity demanding a wholesale market where the hotel-keeper, the restaurateur, the boarding-house-keeper, and even the head of the most modest *menage* can go in the early morning and buy direct from the producer. We are for ever hearing so much about the cost of living. The producer is not living riotously on the proceeds of his sales, neither, so far as I can gather, is the middleman; and yet the consumer complains most lamentably. I am informed that certain by-laws are necessary before produce is compelled to go through the markets. I have consulted the Chief Inspector of Fisheries on the matter of controlling the fish trade, and I would suggest that in the interest of all

concerned, if the cost of living in the metropolitan district is to be cheapened, that wholesale markets should be established. It is easy to see how well they would work in with the Cool Storage Chambers. Moderate interest on the capital invested would be earned by the Government, and the cost of living would be reduced to the consumer, with the consequence that population would be attracted and production encouraged. I may add that soil-production is retarded more by the vagaries of the market than by not being able to find a market for one's produce. As matters are now, it is purely a speculative business, and the small man we desire to encourage cannot afford to speculate.

OUR STATE.

Mr. George Berry, in the course of a lecture delivered at the Imperial Institute, London, on Western Australia, in referring to the agricultural outlook is reported as follows :—

“ Perhaps the most interesting part of Mr. Berry's lecture was that in which he referred to the agriculture, horticulture, and viticulture of the colony. If one could imagine, he said, that all the gold in Western Australia had been worked out, and the timber cut down, still the country would have a great future before it. It was as large as the following nine European countries :—Austria, Germany, France, Great Britain, Norway, Portugal, Switzerland, the Netherlands, and Denmark. Its climate and soils were very varied, and every fruit, flower, vegetable, and grain that grew in tropical, semi-tropical, and temperate regions could flourish in the colony. In parts the rainfall was ample. Large quantities of agricultural produce were still imported, consequently there was a market near at hand, and the land laws were very liberal.

In enumerating the various farming pursuits which were specially adapted for the different parts of the colony, Mr. Berry said that it contained the finest wheat-growing country in the world, and that the sunny slopes of some of the hills were peculiarly fitted for the cultivation of grape vines. Other parts, again, provided excellent pasture for the rearing of sheep, and the breeding of horses. Remounts for the Indian army were obtained from Western Australia, and it had been suggested that the English army should obtain theirs from the same source.

Portions of the colony were, of course, quite unsuited for farming, but out of its enormous area of 625,000,000 acres, there was a large quantity of excellent agricultural land, only about 6 or 6½ million acres of which had, as yet, been alienated, or was in the process of alienation. Land settlement was proceeding apace, owing to the energy displayed by the responsible officers of the Government, and the area under cultivation had increased from 69,678 acres in 1891 to 171,164 acres in 1899.

At the conclusion of the lecture Mr. Berry showed an excellent series of about 100 slides, illustrating, especially, the farming operations of the colony, and also the rapid increase and development of the towns. Among the latter the fine buildings of Perth, and the harbour works of Fremantle were specially noticeable.

In proposing the customary vote of thanks, which was very heartily responded to, Sir Edward Wittenoom said that he thought the audience would agree with him that Mr. Berry had gone into his subject very thoroughly, had given a great deal of information in connection with the colony, and had brought out the following points very clearly:—(1) That Western Australia was now the largest gold-producing colony in the world, (2) That land could be obtained there under cheaper conditions than in any other part of the world, and (3) That the colony afforded excellent openings for the agriculturist as it was not yet an exporter, from that point of view, and consequently there was a good market for all that it produced."

A NEW VEGETABLE.

A new vegetable, and one that promises to be a great acquisition, says the *Australasian*, is the asparagus pea, introduced into Victoria by Lord Hopetoun. It is extremely prolific, and most people would pronounce it a delicious vegetable when properly prepared, combining, as it does, the pronounced flavour of asparagus with the delicate suggestion of the table pea. The method of culture is that of the ordinary pea, and the particulars as to price of seed, &c., can be obtained from Messrs. Adamson and Son. Amongst other places where it can be seen in full profusion is the Leongatha Labour Colony, and the head gardener there states that it is suited to all classes of climate, thriving almost equally well with or without watering.

The plant is of a prostrate nature, branching much like a rock melon, and spreading nearly two feet. Stem prostrate, leaves tri-foliate, leaflets spatulate ovate, an inch in length, two stipules ovate, flower axillary, and of a scarlet red and purple, giving the appearance of a field of red clover. Pod square, with fringe on each side, 2in. to 4in. long, containing six to ten small peas. The pod is cooked and eaten with the fingers, after the manner of asparagus.

With reference to the above, Mr. Wicken of the Department of Agriculture, to whom the matter was referred, said:—"I have grown this for several years. When I came over here last March I brought a small quantity of this seed and sent some to Subiaco for trial, and some to Drakesbrook. They both came up, but that at Subiaco has not done very well, while that at Drakesbrook was not sufficiently forward to report on at my last visit."

THE WOOL MARKET.

The *West Australian* correspondent at Bradford, Yorkshire, in writing on the wool market, says in regard to the false packing of fleeces:—"This subject is one which concerns vitally the well-being of the whole trade, and one which appeals specially to the growers of the staple. To send goods to market in an honest, commendable form should be the aim of every producer, no matter what line of product he is dealing with; but somehow the weakness of human nature will assert itself, and the temptation to try to 'fake' on an unsuspecting public the unreal for the real, the 'shoddy' for the 'all wool,' does at times manifest itself in spite of the continual warnings that it is wrong. At a special meeting of the Bradford Chamber of Commerce two resolutions were passed, both of which vitally concerns alike our home and colonial wool-growers, but especially the former. If I give the resolutions in the order they were passed, readers will be able to infer for themselves their true meaning. In both cases they were moved by the principal of the largest and most important wool-house in Bradford, the first resolution being as follows:—"That this meeting of the wool trade section of the Bradford Chamber of Commerce calls attention to the injurious practice of tying fleece with vegetable band or string, and, owing to the risk of such vegetable fibres getting into the manufactured material, urges foreign and colonial chambers to bring the matter under the notice of the wool-growers and merchants, and to take any other action that may be considered desirable with a view to stopping the practice."

"The above matter is one which, really speaking, wool-growers cannot appreciate so fully as can the manufacturer, for they only know the trouble which fluffy hempen string causes by being entangled in the wool. Put it down as a solid fact that once let band become entangled with wool fibres, and injury is going to be caused somewhere. And this for three reasons. First, it is impossible to pick out the loose fibres which have left the sides of the string and become embedded with the wool. Second, the fibres being vegetable and not animal do not behave in the different process of manufacture like the wool fibre does, being too, of a different colour and length; and thirdly, will not dye like wool, but shows up in the finished fabric in a very ludicrous way, refusing to be dyed, but in a way almost opposite to the rest of the piece. These objectionable features are such as ought to cause the complete abolishment of string in connection with wool once and for all, for its use cannot be justified in the least.

"It is said that old customs 'die hard,' and this must be a case in point. Still, shorn fleeces need, and should not be tied at all, but simply rolled and folded and tucked in very much after the manner of folding a table-cloth. Tying fleeces with string of any kind only means the consumption of valuable time, both on the sheep station and in the mills, time, which in these days of express

speed, can be utilised to far better advantage than in untying fleeces of wool.

"Taken altogether, the use of string in tying up fleeces is absolutely unnecessary. The wool sells better without it. It causes loss of time and money in handling, and owing to its injurious nature should be entirely and forever discarded.

"The second resolution submitted to the meeting had reference to the question of false packing by rolling in the fleeces, dirt, sheep dung, heavy locks, and almost anything to make the wool weigh. In this respect our colonial sheep-men may rightly claim to be exempted from this baneful and dishonest practice, at least Australian squatters can, but it is very prevalent in South Africa and here in England.

"This subject seems to me to touch both home and colonial sheep men, and 'broaches' a subject of very practical moment and concern. What man is there that does not know that when the confidence of the buyer is destroyed, his commodity, whatever he may be trying to sell, does not materially suffer? The greatest mistake in the world that any wool grower can make is to think that when his clip is sold he has heard the last about it. English farmers' clips, and some colonial brands we could name, are to-day suffering on the market on this very ground alone, caused in the past by their wool being falsely prepared for market. The clip has been bought by someone who has found that through carelessness in packing it has wasted unduly, and resulted badly, the effect being that the next time it has been sold competition has been limited, and with the knowledge of the past, the price paid has been calculated on the extra loss in weight the wool was expected to make. Let growers remember it is to their very best interests to build up a good name amongst buyers for their clips, and then the very best price possible is always paid them. The following is the second resolution passed:—"That this meeting of the wool trade condemns in the strongest manner the practice of some firms leaving clags or doddings, locks and tailings, in fleeces (either washed or greasy), as with the present arrangements at the auctions it is quite impracticable for buyers to make a thorough examination of the interior of the fleeces."

ANNUAL CONFERENCE OF PRODUCERS.

It has been decided to hold the Annual Conference of Producers on Tuesday, March 5th, the same week as the National Show of Produce. The Secretary of the Department of Agriculture, by circular to all registered Societies, requests that all resolutions to be brought forward shall be sent in to him on or before the 31st inst. As in previous years, two delegates are invited from each Society. It is suggested that the various delegates shall be entrusted with the exhibits from their respective districts for the National Show.

FRUIT FLY.

In the course of an interview with a press reporter seeking information on the re-appearance of the Fruit Fly in the orchards of the Swan district this year, Mr. Despeissis, the Horticultural Expert of the Department of Agriculture, answered that the Fruit Fly had been reported to have made its appearance this season. Whether its effects would be as disastrous as it had been in previous seasons depended largely on individual as well as concerted action on the part of the fruitgrowers themselves. If in their own interest, they carefully pick every day and destroy by burning or boiling all fallen fruit and fruit unmistakably wormy, still hanging on trees, the pest would, to a considerable extent, be checked.

In this matter, however, experience has taught that the amateur fruitgrower is the chief culprit. Either through ignorance or through apathy and unconcern regarding the loss to others, they often leave under infested trees a litter of maggotty fruit. So rapidly does the insect propagate, that if unchecked it is able in the space of one summer to beget quite an appalling number of fruit flies. These are gorgeously marked little creatures, a little smaller than the common house fly. When at rest they carry their wings widespread. It is chiefly by the grub that it is known. These when full fed are about a quarter of an inch long, and not unlike the grub of the meat fly. In a few hours from the time the eggs are deposited under the skin of the fruit, they hatch out and bore and feed on the sweet pulp around. Ten to twelve days after, these grubs are full fed, and they drop out of the fruit, if this still hangs on the tree; they burrow an inch or two under the surface, and there pupate and turn into chrysalis and eventually emerge again as perfect flies.

There is in the country an indigenous fly somewhat related to the Mediterranean Fruit Fly. It is seen infesting the fruit of the quondong or native peach, but has never yet been reported as having infested orchard fruit. The fly which now concerns us has been recorded both in the East and the West Indies, in South Africa, and Mauritius, but it is especially prevalent along the shores and in the islands of the Mediterranean.

There is in Queensland and in the warmer coastal districts of New South Wales a still more destructive fruit fly, known as the Queensland Fruit Fly. This particular one, unlike the one we know here, attacks the grapes among other fruits. In fact so destructive are both these species in that part of Australia, that Mr. G. Compere, special agent to the Californian Board of Horticulture, writing from Queensland regarding the ravages of the Fruit Flies, thus expresses himself:—"The growing of deciduous fruit in Queensland is a thing of the past. It made me sick at heart to see the destructive work of this pest; not a peach, plum, prune or apricot is allowed to escape its attack."

Referring to the methods employed for checking the fly, there is it seems no absolutely reliable remedy; the measures adopted for the suppression of the pest are purely preventives. Every effort should be directed at the suppression of the first brood in the spring and early summer, by attention to the precautionary measures already referred to. The use of mosquito netting around especially valuable trees has been found effective. Second-hand cases should never be introduced into clean orchards or localities, as they have been proved to be frequent carriers of this as well as other pests. New packing cases can now be got from some of the Perth produce merchants. The inspectors under the insect Pest Act have already started on an inspection of the orchards and gardens of the Swan district, the only district hitherto infested by the fly, and the compulsory destruction of fruit from worm-infested trees will be strictly enforced. The amateur fruit growers will, in this respect, be given closest attention, as well as the produce markets and the fruit shops.

A CLEAN NURSERY.

The Chief Inspector of the Insect Pests Act has been pleased to issue a certificate to Mr. Hawter, which speaks for itself, and is as follows:—"I have had Mr. Hawter's Blackwood Nursery thoroughly inspected by Mr. Jefferson on the 4th of June, 1900, and the 19th of June in the same year, and by Mr. Lankester a few days ago. Special attention was directed to the state of the nursery as regards scaly or other pernicious blights; a tree to tree examination was conducted with the result that no scale insects of any kind were detected, and we have every reason to believe the nursery stock is in a healthy condition." This was supplemented by the Secretary of the Department of Agriculture, who said:—"I have much pleasure in stating that on a recent visit to the above nursery, I was much struck with the growth, vigor and generally healthy appearance of all the trees I saw."

A NEW AGRICULTURAL PUBLICATION.—We have pleasure in noting the receipt of the first issue of the *Geraldton Agricultural Society's Journal*. Its contents are well written, and it is a step in the right direction. We trust that it will have a long and useful life, for it is by the dissemination of such literature that so much good results.

THE "AUSTRALIAN BEE BULLETIN."—We have been asked to correct the statement made in our issue of August last, that Mr. Pender was the editor of the *Australian Bee Bulletin*, and to say that Mr. Pender has no connection with the paper, Mr. E. Tipper being the editor and sole proprietor.

GARDEN NOTES FOR JANUARY.

BY PERCY G. WICKEN.

The ground is now becoming dry, and the chance of rain during the next two months is very remote. Vegetables will be getting scarce, and those who have a supply of water which they can use for irrigation purposes should make the most of their opportunity, and reap the benefit of their energy or good fortune. When the ground requires irrigating give it a real good soaking, then leave until the surface is dry, then run the harrows or cultivators over it to keep the moisture in the soil. Don't irrigate too often, but while at it give the roots a good supply of water. Those who have no water supply available for irrigation purposes can only make the best use of their time by keeping the ground well stirred up, and thereby keeping all the moisture possible in the soil.

Use farmyard manure wherever possible, it is best well rotted, but if that is not to be obtained, use it in any form you can get it. It can be used as a mulching during the dry weather, and dug in when not required. A good mulching is a great help to the vegetables, almost any substance that will rot may be used as a mulching, dead leaves, rakings from the bush, straw, winnowings from cereals, dead weeds, rushes, etc. I have also used well-rotted sawdust with good effects although I would not recommend its use while fresh. Cut all weeds down before they have an opportunity of seeding, and thereby prevent them spreading next season, they will soon die off if cut down this weather. Keep your headlands and fences free from weeds, we often see this part covered with weeds and supplying seeds to the surrounding country free of charge. Under the new Noxious Weeds Act, Nut Grass, Bathurst Burr, and Stinkwort are proclaimed noxious weeds throughout the State, and their destruction is compulsory or a fine may be inflicted and the weeds destroyed at owner's cost. Agriculturists should, therefore, keep a sharp eye for these weeds in their holdings, and knock them down as soon as they appear.

FRENCH BEANS.—This is about the best vegetable to grow during the hottest part of the year, and where any moisture at all is available a supply may be planted, but it is no use to plant out where the ground is too dry. The butter bean is a good variety to sow.

MADAGASCAR BEAN.—These should now be coming into bearing. The beans grow in bunches, they should be picked young, cut into slices, and cooked the same way as French beans, the whole pod being used. The flavor is rather strong, but they make a change, and grow during the hottest weather.

LIMA BEANS.—Early varieties should now be in bearing, they are very prolific. These beans are shelled and cooked the same as green peas, and with a little butter over them, are one of the most delicious dishes to be obtained. They are grown in nearly all parts of the world, and are largely used for food.

CABBAGES AND CAULIFLOWERS.—Seed beds of these plants may now be made so as to be ready for planting out later on. The land should also be prepared and well worked up ready for planting out next month, or as soon as possible after the first rain.

MELONS (WATER, ROCK, AND PRESERVING).—It is too late to plant out with any hope of success this season. The early sown melons should now be coming in. Mark those you intend to keep for seed and leave in the field until quite ripe.

MAIZE AND SORGHUM may be sown for green feed, but it is too late to sow for grain. It may be sown either broadcast or in drills as required. It is much better in drills.

PUMPKINS.—The early varieties will now be ready to cut. Those that are to be stored away for the National or other coming shows or for winter use, should be carefully handled and laid on straw in a dry shed when they will, if sound, keep for months.

SWEET POTATOES.—These may require a little hilling up and to be kept free from weeds; it is too late to put out more cuttings.

TOMATOES.—This fruit is now plentiful and everyone should have a good supply; more plants may be put out if available. Those not already staked should be done at once. Should any black spot or other fungus disease appear, the fruit should be pulled off and burnt so as to prevent the disease from spreading. Pulling the rotten ones off and throwing on the ground is not sufficient to destroy the disease, in fact only helps to spread it.

TURNIPS.—Towards the end of the month, if the ground is sufficiently moist, a number of turnips may be planted out and if properly cultivated will do well. A little superphosphate is the best manure to apply to this crop.

FARM.—Harvesting will be over in some parts, but in others it is still in full swing and no time is to spare for other work. Great danger exists at this time from fire, and all precautions must be taken by ploughing fire breaks and other means to guard against loss by this scourge. Where the ground is moist enough to plough, a crop of cow pea may be put in directly the wheat is taken off, and if ploughed in before sowing the next crop will supply it with nitrogenous manure and the ground will benefit by the additional working. Wherever it is possible to do so, the ground should be ploughed as soon as the crop is taken off and left fallow until time to sow the next crop.

AUSTRALIAN SEED FOR SOUTH AFRICA.

Mr. John G. Connan, of Draghender, South Africa, has written to the Secretary of the Department of Agriculture for some seed of the White Gum or Wandoo tree, also seeds of salt-bushes, Mr. Connan having heard from one of the Contingent from this State that the district where he lives is very like our Murchison country. The seeds have been sent as requested.

ANSWERS TO CORRESPONDENTS.

Mr. H. Dale Cullen, Armadale, writes asking if "wobbles" (evidently *Zamia* poisoning) in cows affects the milk. The matter being referred to the Dairy Expert, Mr. Crawford replies:—"From all reports and examinations the milk from cows suffering from "wobbles" does not seem to be affected in any way injurious to the health of human beings."

Mr. E. F. DeLacy, Marble Bar, forwards an interesting letter on the cultivation of the "ramie" plant. This is referred to in our Notes on page 7.

Mr. E. Powell, Beverley, forwards photographs of his wheat crop and homestead. We have referred to this in our Notes on page 4, and have also published the photographs.

Mr. W. J. Eccleston, Boyanup, writes with reference to destroying woolly aphids:—"The best method to use is a solution of whale-oil soap, at the rate of one to four pounds of soap to each gallon of water. Spray with a certain amount of force, so as to penetrate the cracks and crevices and dislodge the aphides. The treatment should be repeated at intervals of not more than a fortnight until the trees are freed from the pest. If the woolly aphid is on the roots, as often occurs when the trees are planted prior to the introduction of blight-proof stocks, it should be thoroughly treated there also, as otherwise it only re-infests the top of the tree again as fast as it is cleared."

Mr. O. R. Taylor, Wagin, writes, saying:—"I have a turkey gobbler which has been sick for a few days with hard yellow lumps about the head, which have partly closed one eye. What is the complaint, and what is the proper treatment?" This matter was referred to the Poultry Expert, who replied as follows:—"The bird is probably suffering from roup. He should be isolated from all others. The affected parts should be well bathed in vinegar and water, one tablespoonful of vinegar to a quarter of a pint of water. The mixture should be comfortably warm, and should be used three times a day until the swelling subsides. Give sulphate of iron in drinking water at the rate of one ounce to the gallon. As there is a considerable risk of infection, it would be as well to give all the fowls sulphate of iron in their water in the same proportions. Give a quinine pill night and morning. Mix as much quinine as will lightly cover a threepenny piece with a little fresh bread or flour and water, and give it until he shows signs of getting better. Feed on soft food only."

Mrs. Nesbit, York, writes, asking:—"1. If ducks hatched this Spring are better for next season's laying than last year's ducks? 2. If hatched by incubators will they lay as well as if hatched by hens? 3. Is there any particular time, as I imported Indian Runner ducks two years ago, and they were worse layers than any I ever had." The matter was referred to the Poultry expert, who replies:—"1. Last year's ducks will probably lay more eggs than this season's. 2. Ducks hatched by incubators are quite as good layers as those hatched by hens. 3. The Indian Runners imported may be old birds, or may not be pure. As a rule, this breed will average over 200 eggs per season, and even when kept closed up in a small yard in this State they have averaged over 190 eggs per season. They lay off and on all the year round."

From various correspondents re the National Show, as to the application for space and the latest date for sending in exhibits.—Applications for space and details of exhibits must be in hands of Secretary of Department of Agriculture on or before February 1st, and all exhibits must reach the Queen's Hall, Perth, not later than the 2nd of March next. Arrangements have been made whereby all exhibits may be stored in the Government Cool Storage Depot, Wellington-street. Entry forms, address labels, &c., may be had on application to the Department. Officers from the Department are now visiting the various districts for the purpose of collecting and arranging for exhibits.

MARKET REPORT.

FOR MONTH ENDING JANUARY 10TH.

The West Australian General Produce Co. report sales effected for the following articles, on account of various consignees, for the month ended January 10, 1901:—Sales effected during the past month were extremely good, several consignments of local produce coming forward, and good business anticipated. Bacon—Owing to extremely hot weather, sales rather weaker. Hams. Market bare, with strong demand. Expect a consignment within a few days. Butter—Great scarcity continues on spot, owing to holidays having interfered with regular shipments, and it will take a week or two before supplies right themselves. Lard and pastry butter selling fairly well. Cheese regular; good outlet; stocks good. Eggs—Local supplies a little better lately; values easing. Potatoes—Better supplies arriving; prices decreasing correspondingly. Victoria new crop shipment expected shortly. Onions unchanged. Chaff—Supplies rather short on spot, with numerous enquiries for good quality. Hay—Oaten in particular in fair demand. Bran and Pollard—Find continuous steady outlet, and values very firm. Flour—Bakers and others operating lightly owing to the contracting period being near at hand. Oats—Feed lots offering freely, but in some cases forced sales have been attempted. Wheat—So far, consignments of new season's have been slow, result of prices remaining still high, thus holders who may send in time might reap special advantages. Oil Cake—Consignments of late much disturbed owing to the holidays. A shipment expected the latter end of next week. Fruit—Several summer varieties have put in an appearance, and sales very substantial and most beneficial for the growers. Lemons had a good run owing to the hot weather, and stocks have diminished considerably; probable rise in values. Many enquiries for rock melons, water melons of medium size, and half-green tomatoes fit to travel for goldfields. Vegetables—Very little demand, and hard to dispose of with the exception of thoroughly ripe pumpkins. Salads—Usual seasonable demand. Poultry—For table requirements very good steady outlet, and especially young roosters preferred. Game—Many enquiries for wild ducks and teal, and for which good prices could be obtained if delivered in good condition.

Farm and Dairy Produce:—Bacon—Sides, 10d to 11d lb. Hams—10d, 1s to 1s 2d. Butter—Prime Victorian, 1s 1d to 1s 1½d lb; pastry, 9½d to 10½d lb. Lard—in 11b tins, 9s 6d doz. Cheese—Medium, 8½d to 9d; loaf, 9½d to 9½d lb. Eggs—Local, 1s 8d to 2s 9d doz.; imported, 1s 1d to 1s 2d doz. Potatoes—Local, £9 to £10 ton. Onions—9s to 10s per cwt. Chaff—Worth from £4 5s to £5 5s per ton. Hay—Oaten, in 1cwt. bales, £3 10s ton. Straw—Worth £3 10s. Bran—£6 10s to £7. Pollard—£6 15s to £7 10s. Flour—Local, sacks, £9 to £9 5s; quarters, £9 5s to £9 10s. Oats—N.Z., 2s 11d to 3s 6d, according to quantity. Maize—Whole, 6s 6d bushel. Wheat—4s 3d to 4s 6d bushel. Oil Cake, £7 per ton; 7s 6d per cwt. Peas—Dry, blue boiling, 6s 6d to 7s bushel. Fruit.—Oranges—Italian, 20s to 22s 6d case. Lemons—Italian, 18s 6d to 22s 6d case. Grapes—Wine sorts, 5s to 8s 6d case; Sweetwaters, 10s to 12s 6d case; Crystals, 14s case. Figs, 2d to 4d doz. Peaches, 15s to 25s case. Apricots, 12s to 21s case. Nectarines, worth 15s to 30s case. Cape Gooseberries, 2d to 3d lb. Plums, 6s 6d to 10s case. Apples, 7s 6d to 14s case. Pears, 8s 6d to 12s 6d case. Currants—Zante, 3s to 5s case. Melons—Rock, from 6s to 20s doz; Water, from 7s to 10s cwt. Vegetables—'abbage, worth 1s 6d to 3s per cwt. Carrots, 1s 6d doz bunches. Parsnips, 2s doz bunches. Turnips—White, 1s 6d doz bunches. Beans—French, 1d to 2d lb. Peas unsaleable, Marrows, 2s to 3s doz. Pumpkins, 5s to 7s cwt. Rhubarb, 1½d to 2d lb. Capsicums and Chillies, 6d lb. Garlic, 6d lb. Salads and Herbs.—Lettuce, 8d to 1s doz. Spring Onions, 6d to 8d doz bunches.

Beetroot, 1s 6d dozen bunches. Cucumber, 2d to 4d doz. Tomatoes, 2s to 3s 6d case. Celery, 1s 6d doz. heads. Cress, worth 6d dozen bunches. Thyme, Marjorum, Sage (off stalk), 6d lb. Mint (off stalk), 4d lb. Poultry.—Fowls—Prime table, 6s 6d pair; others from 5s pair. Chickens, 2s 6d to 3s 6d. Ducks, 6s to 7s. Ducklings, 5s. Geese, 13s. Turkeys—Gobblers, 22s 6d to 27s pair; Hens, 18s to 21s pair. Game:—Black Duck, worth 4s 6d pair. Teal, 2s 6d pair. Wood, 2s. Hardhead, 2s 6d. Bluewing, 2s. Carcase Meat:—Pork, 50 to 60lb, 6½d lb. Sundries:—Bonedust, £7 to £7 10s ton. Phosphate, £4 10s; super, £6 10s to £7. Live Guano, £6 10s; dead, £3 10s to £4. Coarse Bacon Salt, £3 10s. New cornsacks, 7s 6d doz.; second-hand, 4s 6d. New Bran Bags, 4s 7d doz.; second-hand, 3s 6d.

THE CLIMATE OF WESTERN AUSTRALIA DURING DECEMBER, 1900.

Throughout the colony generally, south of the tropics, the climate was fairly normal. It is interesting to note how rapidly the day temperature increases from the coast inland, whilst the night temperatures are almost identical. Thus on a fairly west to east line the mean maximum and minimum were:—

			Max.		Min.
Rottneſt ...	...	...	73·8	...	61·8
Fremantle ...	...	...	75·5	...	61·9
Perth Obſervatory ...	...	...	80·0	...	61·0
Perth Gardens ...	...	...	83·6	...	61·2
York ...	...	...	89·3	...	58·1
Southern Cross ...	...	...	91·7	...	61·2

On the ſouth coaſt the temperature was reſreſhingly low. At Breakſea, notwithſtanding one hot day when the temperature juſt exceeded 90·0, the mean of the maximum readings was only 66·0.

In the tropics the month was unuſually dry and hot. The rainfall was conſiderably below the average for previous years and the temperature very ſevere. The greateſt heat was experienced at Nullagine, where the mean maximum was 108·6. This muſt be very nearly, if not quite, an Australian record. The only place where it is likely to be exceeded is in Queensland, but the information published by that colony is ſomewhat meagre. A mean maximum of 108·5 was, however, recorded at Donor's Hill in December, 1894. Great as this heat appears to be, it is comparatively cool compared with at leaſt one place in India, viz., Jacobabad, in the province of Scinde. In 1890 the mean maximum for ſix consecutive months were:—

April ...	103·9	July	107·4
May ...	112·8	August ...	101·3
June ...	114·0	September	105·2

THE CLIMATE OF WESTERN AUSTRALIA.

DURING DECEMBER, 1900
FROM TELEGRAPHIC REPORTS.

LOCALITY.	Barometer (corrected and reduced to Sea Level.)		Temperature.			Rainfall.	
	High- est.	Lowest.	Mean of Month.	Highest Max.	Lowest Min.	Points (100 to inch) in month.	Total Points since Jan. 1.
Wyndham	29.944	29.673	92.6	109.2	73.4	183	1792
Derby .. .. .	.972	.664	90.8	106.2	70.5	249	1690
Broome .. .. .	.961	.673	88.4	108.0	73.0	34	1844
Condon .. .. .	.943	.696	85.8	115.0	67.5	13	1892
Cossack .. .. .	.945	.699	89.6	112.7	72.0	nil	4003
Onslow .. .. .	.922	.654	87.5	114.0	68.0	nil	2896
Carriarvon	30.041	.788	76.6	108.2	68.7	1	1476
Hamelin Pool .. .. .	.078	.766	79.6	106.7	59.0	20	840
Geraldton .. .. .	.099	.791	71.1	102.0	54.0	2	2102
Hall's Creek	29.982	.711	91.5	110.2	60.6	73	1709
Nullagine .. .. .	.917	.640	93.2	113.0	68.0	6	1570
Peak Hill .. .. .	.964	.611	88.2	109.7	67.8	4	2499
Lake Way							
Cue	30.032	.624	84.3	111.5	59.5	13	1975
Yalgoo .. .. .	.042	.614	81.5	107.8	55.0	70	1266
Lawlers .. .. .	.123	.608	83.0	107.2	50.0	nil	1522
Laverton .. .. .	.140	.682	80.6	109.2	57.0	7	1550
Menzies .. .. .	.168	.623	79.8	106.6	53.6	5	1217
Kalgoorlie .. .. .	.191	.643	76.6	104.8	50.6	72	1171
Coolgardie .. .. .	.179	.705	75.3	105.4	59.0	141	1197
Southern Cross .. .. .	.158	.633	78.4	106.0	49.1	27	1129
York .. .. .	.237	.650	73.7	105.0	46.0	34	2110
Perth Gardens .. .. .	.245	.732	72.4	99.6	52.6	56	8625
Perth Observatory .. .. .	.248	.732	70.5	98.8	52.1	52	8631
Fremantle .. .. .	.224	.750	68.7	90.0	53.5	20	2741
Rottneet .. .. .	.141	.659	67.8	87.0	53.0	25	2576
Mandurah			68.9	94.0	49.0	143	4188
Co lie			66.3	94.5	41.4	129	
Bunbury .. .. .	.257	.750	69.1	95.0	47.2	26	4071
Busselton			65.8	91.0	43.0	78	3780
Bridgetown			65.2	95.0	37.0	188	4432
Karridale .. .. .	.274	.700	64.6	88.0	44.0	53	5181
Cape Leenwin .. .. .	.273	.617	66.4	85.0	54.5	90	4184
Katanning .. .. .	.289	.704	68.4	97.5	41.2	117	2126
Albany .. .. .	.817	.690	64.0	94.2	41.2	65	3729
Breaksea Island .. .. .	.305	.854	62.0	90.5	51.0	112	2772
Esperance .. .. .	.299	.709	65.9	96.8	40.8	195	2930
Balladonia							
Eyre .. .. .	.249	.610	104.5	104.5	39.8	12	1664

THE OBSERVATORY, PERTH.

W. E. COOKE, GOVERNMENT ASTRONOMER.

RAINFALL for Nov., 1900 (completed as far as possible),
and for Dec., 1900 (principally from Telegraphic Reports).

STATIONS	Nov.		Dec.		STATIONS	Nov.		Dec.	
	No. of points. 100 equals lin.	No. of wet days	No. of points. 100 equals lin.	No. of wet days		No. of points. 100 equals lin.	No. of wet days	No. of points. 100 equals lin.	No. of wet days
EAST KIMBERLEY :					N'TH-WEST.—Cont.				
Wyndham ..	347	7	133	..	Millstream ..	..	..	..	..
6-Mile ..	..	..	..	..	Hong Kong ..	..	..	..	..
Carlton ..	293	9	..	..	Mallina ..	..	..	..	..
Denham ..	..	..	..	..	Whim Creek ..	Nil	..	Nil	..
Rasewood Downs ..	..	..	..	..	Cooyapooya ..	Nil	..	..	..
Argyle Downs ..	..	..	..	..	Woodbroke ..	Nil	..	..	..
Lisadell ..	..	..	..	..	Croydon ..	..	..	..	..
Turkey Creek ..	97	..	118	7	Balla Balla ..	Nil	..	Nil	..
Ord River ..	181	..	..	..	Roebourne ..	Nil	..	Nil	..
Koojubrin ..	..	..	..	..	Cossack ..	Nil	..	Nil	..
Hall's Creek ..	243	..	73	..	Fortescue ..	Nil	..	Nil	..
Flora Valley ..	..	..	..	..	Mardie ..	Nil	..	..	..
Ruby Creek ..	..	..	..	..	Mt. Stewart ..	..	..	..	..
Denison Downs ..	..	..	..	..	Yarraloola ..	..	..	..	..
WEST KIMBERLEY :					Chinginarra ..	Nil	..	Nil	..
Obagama ..	..	..	..	..	Onslow ..	Nil	..	..	..
Derby ..	34	1	249	..	Peedamullah ..	..	..	..	..
Yeeda ..	46	1	89	..	Clifton Downs ..	Nil	..	..	..
Liveringa ..	..	..	..	..	Red Hill ..	..	..	..	..
Mt. Anderson ..	..	..	..	..	Mt. Mortimer ..	Nil	..	..	..
Leopold Downs ..	..	..	..	..	Wogoola ..	Nil	..	..	..
Fitzroy Crossing ..	57	..	251	8	Point Cloates ..	3	1	..	..
Quanbun ..	50	3	..	..	GASCOYNE :				
Nookanbah ..	..	..	..	..	Winning Pool ..	Nil	..	Nil	..
Broome ..	Nil	..	34	2	Towara ..	Nil	..	..	..
Thangoo ..	..	..	..	..	Ullawarra ..	Nil	..	..	..
La Grange Bay ..	1	1	19	2	Woorkadjia ..	..	..	..	..
NORTH-WEST :					Minnie Creek ..	..	..	..	..
Wallal ..	Nil	..	4	2	Yanyearreddy ..	Nil	..	..	..
Condon ..	Nil	..	13	..	Williambury ..	..	..	..	..
DeGrey River ..	62	1	..	..	Boolathana ..	..	..	..	..
Port Hedland ..	Nil	..	Nil	..	Carnarvon ..	6	3	1	1
Boodarie ..	Nil	..	..	..	Cooralya ..	..	..	..	..
Yule River ..	..	..	..	..	Doorawarra ..	..	..	..	..
Warralong ..	..	..	..	..	Mungarra ..	..	..	..	..
Muccan ..	..	..	..	..	Erravilla ..	..	..	..	..
Mulgie ..	Nil	..	..	..	Dirk Hortog Is. ..	26	4	..	..
Eel Creek ..	..	..	..	..	Sharks Bay ..	2	1	Nil	..
Coongon ..	..	..	..	..	Meedo ..	Nil	..	..	..
Warrawagine ..	..	..	..	..	Tamala ..	7	1	..	..
Bamboo Creek ..	9	..	88	4	Wooramel ..	Nil	..	51	..
Marble Bar ..	223	1	8	2	Hamelin Pool ..	14	2	20	..
Warrawoona ..	15	2	49	2	Byro ..	6	1	..	..
Corunna Downs ..	..	..	..	..	Peak Hill ..	28	2	4	..
Nullagine ..	14	1	6	..	Abbotts ..	31	2	14	1
Tambourah ..	Nil	..	107	3	Belele ..	73	2	..	..
Mulga Downs ..	Nil	..	..	..	Mileura ..	Nil	..	20	2
Mt. Florence ..	..	..	..	..	Manfred ..	30	1	..	..
					Woogarang ..	Nil	..	11	2

RAINFALL.—Continued.

STATIONS	Nov.		Dec.		STATIONS	Nov.		Dec.	
	No. of points. 100 equals lin.	No. of wet days	No. of points. 100 equals lin.	No. of wet days		No. of points. 100 equals lin.	No. of wet days	No. of points. 100 equals lin.	No. of wet days
GASCOYNE—Cont.					S.W. Div.—Cont.				
Wooleane ..	Nil	..	14	1	Belvoir ..	23	2	34	2
Dairy Creek ..	Nil	..	..	..	Mundaring Weir ..	101	5	..	..
Meka ..	10	2	31	1	Guildford ..	37	2	23	2
Mt. Wittenoom ..	15	2	..	..	Canning Timber Mills ..	83	3	..	..
Nannine ..	27	2	Nil	..	Kalbyamba ..	42	3	..	..
Star of the East ..	3	1	3	1	Canning Water- works ..	8	3	105	2
Annean ..	..	..	..	..	Perth Gardens ..	38	3	56	2
Tuckanarra ..	5	1	Nil	..	„ Observatory ..	40	3	52	3
Coodardy ..	55	1	..	..	Subiaco ..	24	2	74	2
Cue ..	21	1	13	1	Claremont ..	11	1	41	2
Day Dawn ..	2	1	Nil	..	„ (Richardson) ..	15	2	39	2
Lake Austin ..	10	3	Nil	..	Fremantle ..	28	3	20	2
Lennonville ..	24	2	9	1	Rottneet ..	22	2	25	4
Mt. Magnet ..	8	1	1	1	Rockingham ..	24	2	54	3
Murrum ..	Nil	..	20	1	Jarrahdale ..	96	3	17	1
Yalgoo ..	2	1	70	..	Mandurah ..	24	1	143	2
Gabyon ..	5	1	..	..	Pinjarrah ..	88	4	62	3
Gullewa ..	11	3	43	2	Harvey ..	48	5	105	6
SOUTH-WEST DIVI- SION (N'N PART):					SOUTH-WEST, CEN- TRAL PART (IN- LAND):				
Murchison House ..	40	4	..	..	Momberkine ..	9	1	..	..
Mt. View ..	4	1	Nil	..	Culham ..	12	2	57	2
Yuin ..	Nil	..	..	..	Newcastle ..	33	3	40	1
Northampton ..	47	2	Nil	..	Eumalga ..	52	4	40	2
Mt. Erin ..	30	2	Nil	..	Northam ..	7	1	58	2
Oakabella ..	..	..	..	..	Grass Valley ..	7	1	..	..
Tibradden ..	38	5	..	..	Meckering ..	5	1	40	2
Sand Springs ..	35	2	11	1	Doongin ..	91	3	22	1
Mullewa ..	19	2	Nil	..	White Haven ..	5	2	..	..
Bootenal ..	..	..	..	..	Sunset Hill ..	69	3	25	1
Geraldton ..	30	5	2	1	Cobham ..	12	3	40	2
Greenough ..	34	4	Nil	..	York ..	36	3	34	1
Dongara ..	76	3	3	1	Beverley ..	30	4	31	1
Dongara (Pearse) ..	73	3	4	1	Barrington ..	54	3	..	..
Strawberry ..	23	2	..	..	Sunning Hill ..	15	1	..	..
Minginew ..	21	3	9	2	Wandering ..	26	3	145	2
Rothesay ..	..	..	..	..	Pingelly ..	10	2	71	2
Field's Find ..	Nil	..	67	2	Marradong ..	33	3	60	3
Carnamah ..	46	4	36	2	Bannister ..	32	2	64	2
Watheroo ..	12	1	Nil	..	Narrogin ..	12	3	95	3
Dandaragan ..	36	4	78	2	Wickepin ..	13	1	136	4
Moora ..	17	3	11	2	SOUTH-WEST DIVI- SION (S'N PART):				
Yatheroo ..	47	5	88	3	Bunbury ..	52	4	26	7
Walebing ..	25	3	39	3	Collie ..	53	5	129	5
New Norcia ..	18	3	50	3	Glen Mervyn ..	191	6	46	4
SOUTH-WEST DIVI- SION, CENTRAL (COASTAL):					Dardanup ..	78	3	39	3
Gingin ..	34	3	76	2					

RAINFALL.—Continued.

STATIONS	Nov.		Dec.		STATIONS	Nov.		Dec.	
	No. of points. 100 equals lin.	No. of wet days	No. of points. 100 equals lin.	No. of wet days		No. of points. 100 equals lin.	No. of wet days	No. of points. 100 equals lin.	No. of wet days
SOUTH-WEST--Cont.					EASTERN DIVISION				
Donnybrook ..	80	2	77	8	—Continued.				
Boyanup ..	65	5	93	7	Mt. Leonora ..	87	5	Nil	..
Busselton ..	57	5	78	9	Mt. Malcolm ..	105	6	1	1
Quindalup ..	48	3	41	8	Mt. Morgans ..	97	6	5	1
Margaret River ..	52	3	94	2	Laverton ..	63	5	7	2
Lower Blackwood ..	51	5	59	3	Murrin Murrin ..	98	6	Nil	..
Karridale ..	90	8	58	9	The Granites ..	73	8	5	1
Augusta ..	55	8	57	9	Tampa ..	52	4	Nil	..
Cape Leeuwin ..	86	12	90	..	Niagara ..	90	7	Nil	..
Biddellia ..	Nil	..	71	3	Yerilla ..	72	7	1	1
The Warren ..	103	9	81	5	Menzies ..	146	6	5	1
Lake Muir ..	58	7	83	5	Goongarrie ..	138	5	21	1
Mordalup ..	34	10	75	11	Kurawa ..	43	2	22	1
Deeside ..	53	8	112	7	Dixie Gold Mine..	151	6	110	1
Riverside ..	85	9	114	8	Kurnalpi ..	107	3	20	1
Balbarup ..	20	1	194	8	Bulong ..	53	6	82	1
Wilgerup ..	77	7	..	..	Kanowna ..	52	4	81	1
Mandalup ..	59	3	134	4	Kalgoorlie ..	80	7	72	1
Bridgetown ..	48	6	188	5	Coolgardie ..	100	6	141	1
Greenbushes ..	69	5	176	..	Burbanks ..	70	6	129	2
Williams ..	24	3	70	1	Londonberry ..	75	5	141	2
Arthur ..	15	2	117	3	Woolubar ..	87	9	120	1
Darkan ..	75	3	33	3	Widgiemooltha ..	114	5	137	1
Wagin ..	6	1	86	2	50-Mile Tank ..	124	4	103	1
Glencove ..	15	1	151	4	Norseman ..	69	4	110	2
Dyliabing ..	6	1	174	2	Bulla Bulling ..	72	5	126	1
Katanning ..	8	1	117	..	Woolgangie ..	54	4	..	..
Kojonup ..	21	2	66	2	Boorabbin ..	239	6	152	1
Broomehill ..	5	1	68	2	Karalee ..	170	5	72	1
Sunnyside ..	7	2	110	7	Yellowdine ..	24	3	70	1
Woodyarrup ..	10	3	158	4	Southern Cross ..	40	3	27	1
Cranbrook ..	14	3	70	3	Mount Jackson ..	47	3	80	1
Blackwattle ..	66	3	23	2	Burracoppin ..	33	..	7	7
Mt. Barker ..	33	6	123	5	Kellerberrin ..	23	3	122	2
Forest Hill ..	95	13	101	6	Mangowine ..	93	2	..	..
Denmark ..	59	..	72	..	EUCLA DIVISION :				
Albany ..	28	11	65	9	Coconarup ..	40	4	66	5
Point King ..	48	7	71	4	Fanny's Cove ..	33	4	..	..
Breaksea ..	35	9	112	10	Park Farm ..	25	4	201	4
Cape Riche ..	134	4	12	3	Esperance ..	15	5	195	..
Pallinup ..	135	4	22	4	Gibson's Soak ..	27	2	168	4
Bremer Bay ..	11	2	114	3	30-Mile Condenser	65	3	..	..
Jarramongup ..	..	..	..	..	Swan Lagoon ..	51	8	..	..
EASTERN DIVISION :					Grass Patch ..	58	6	..	..
Lake Way ..	31	2	..	..	Lynburn ..	..	..	200	1
Mt. Sir Samuel ..	93	4	Nil	..	Israelite Bay ..	19	2	155	1
Lawlers ..	125	9	Nil	..	Balladonia ..	105	3	118	2
Diorite King ..	124	10	Nil	..	Eyre ..	105	2	12	..
Sturt Meadows ..	128	7	..	..	Eucla ..	43	4	40	3

The Observatory, Perth, Jan., 8th 1901.

W. E. COOKE, Govt. Astronomer.

RETURN OF FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF DECEMBER, 1900.

NAME OF PORT	No. of Ships	No. of Consign- ments Inspected	Total No. of Cases	No. of Cases Passed	No. of Cases Prohibited	No. of Cases Destroyed	No. of Cases in Quarantine	No. of Cases Dipped	No. of Cases of															
									Apricots	Bananas	Cherries	Gooseberries	Grapes	Lemons	Nectarines	Oranges	Passion Fruit	Peaches	Plums	Rhubarb	Strawberries	Pomoloes	Pines	All other fruits
PERMANTE ..	19	30	7719	7719	..	..	2	7719	116	744	1873	435	..	2070	..	1304	..	..	950	..	..	..	..	78
ALBANY ..	8	11	493	488	5	..	..	492	28	86	173	75	..	78	..	..	..	8	60	10	..	..	..	30
GERALDTON ..	1	2	13	13	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	18	..	..
HAMELIN ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BURRILLTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	1	1	10	10	..	..	..	10	..	2	..	..	..	2	..	..	..	..	..	2	..	..	..	4
TOTAL ..	29	44	8235	8230	5	..	2	8231	144	782	2046	530	..	2145	..	1304	..	3	1049	13	..	13	..	112

DEPARTMENT OF AGRICULTURE,
5th January, 1901.

RETURN OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING THE MONTH OF DECEMBER, 1900.

NAME OF PORT	No. of Ships	No. of Consign- ments of Trees or Plants	Total No. of Trees or Plants in such Consignments	No. of Consign- ments Passed	Total No. of Trees or Plants in such Consignments	No. of Consign- ments of Trees or Plants Prohibited	No. of Consign- ments of Trees or Plants in such Consignments	No. of Packages Dipped	No. of Trees																
									Ornamental & Pot Plants	Almonds	Apples	Apricots	Cherries	Figs	Lemons	Limes	Mulberries	Oranges	Peaches	Pears	Plums	Small Fruits	Vine Cuttings	All Other Trees	
FREMANTLE ..	3	5	802	5	802	..	802	12	802	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ALBANY ..	3	3	53	3	53	..	53	7	53	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
GERALDTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMELIN ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSELTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL ..	6	8	855	8	855	..	855	19	855	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

DEPARTMENT OF AGRICULTURE,
5th January, 1901.

NUMBER OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING 1900.

Port	Ornamental and Pot Plants	Almonds	Apples	Apricots	Cherries	Figs	Lemons	Mulberries	Oranges	Peaches	Pears	Plums	Small Fruits	Vine Cuttings	All other Trees	Total	Total Prohibited	Total Imported	Total Dipped Packages
FREMANTLE ..	17745	6437	28845	1596	2393	199	1663	372	12912	9100	9023	3441	10662	7000	4507	116100	..	116100	865
ALBANY ..	1078	10	9713	243	245	90	188	48	194	657	590	576	2318	..	5091	17850	..	17850	104
GERALDTON ..	..	..	..	..	..	..	..	..	250	..	..	..	..	..	..	250	..	250	1
HANMELIN ..	..	..	250	..	..	..	..	..	..	8	..	..	42	..	..	300	..	300	1
BUNBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	50	..	..	..	..	..	..	..	..	..	..	..	..	..	..	50	..	50	1
Total for 1900 ..	18873	6436	38808	1530	2088	288	1867	420	13256	10065	9613	3917	13022	7000	6508	134550	..	134550	475
Total for 1899 ..	20391	631	37817	3099	1218	2756	12644	341	19425	8204	7996	3779	23883	37572	17221	203187	827	204014	817
Increase ..	..	5705	991	..	1430	..	..	81	..	1861	1617	38	..	..	..	..	..	..	..
Decrease ..	7718	..	..	1380	..	2468	10767	..	6169	..	..	..	10811	30572	10623	68637	827	69464	302

DEPARTMENT OF AGRICULTURE,

15th January, 1901.

RETURN OF GREEN FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING 1900.

Port	No. of Cases Passed	No. of Cases Prohibited	No. of Cases Inspected	No. of Cases in Quarantine	No. of Packages	Apricots	Bananas	Cherries	Gooseberries	Grapes	Lemons	Oranges	Passion Fruit	Peaches	Plums	Rhubarb	Pineapples	All other Fruits
FREMANTLE	82305	46	82441	50	32441	116	5327	2203	524	20	9103	10041	800	..	3300	..	..	162
ALBANY	9947	125	4072	..	4061	111	182	382	92	..	1365	1328	16	7	371	22	..	71
GERALDTON	177	..	177	..	116	..	29	..	..	..	..	..	..	..	..	..	..	148
HAMBLIN	1	..	1	..	1	..	..	..	..	..	1	..	..	..	..	..	..	..
BUNBURY	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE	52	..	52	..	52	..	6	2	..	..	22	16	..	..	..	..	..	6
Total for 1900	96572	171	35743	50	36671	227	5444	2557	616	20	10490	12285	816	7	3671	22	..	387
Total for 1899	30179	251	30430	26	30340	189	3398	1387	416	22	8112	11038	1001	51	3568	130	28	239
Increase	66393	..	6313	24	6331	38	2046	1200	200	..	2378	647	..	..	103	..	..	148
Decrease	..	80	..	..	..	..	..	..	..	2	..	..	185	44	..	108	25	..

DEPARTMENT OF AGRICULTURE,
15th January, 1901.



Western Australia.

ANNO SEXAGESIMO QUARTO

VICTORIÆ REGINÆ

No. XI.

AN ACT for the Extirpation of Noxious Weeds.

[Assented to 5th December, 1900.]

BE it enacted by the Queen's Most Excellent Majesty, by and with the advice and consent of the Legislative Council and Legislative Assembly of Western Australia, in this present Parliament assembled, and by the authority of the same, as follows:—

1. THIS ACT may be cited as the Noxious Weeds Act, 1900.
2. THE Spanish Radish and Scotch Thistle Prevention Act, 1874, is hereby repealed.

3. IN this Act, save so far as the context otherwise requires,—

“Clear,” in relation to land, shall mean to cut down and keep cut down, or to grub or pull up the stems or roots of noxious weeds, so as to prevent any part of them from flowering, or to enclose with a sheep-proof fence, and to graze sufficient sheep thereon to prevent noxious weeds from flowering :

“Inspector” shall mean an inspector appointed under this Act :

“Minister” shall mean the Minister presiding over the Department of Agriculture :

“Noxious Weeds” shall mean the plants mentioned in the Schedule hereto, and such other plants as the Governor, by proclamation, shall declare to be noxious ; but, as regards plant so declared to be noxious only in a part or parts of this Colony shall only bear that meaning in the part or parts in which they are declared by such proclamation to be noxious.

4. THE Governor may, at any time, on the recommendation of a municipal council, road board, or of the advisory board of the Department of Agriculture, by proclamation published in the *Government Gazette*, declare any plants to be noxious weeds, either generally or in any particular locality, and may from time to time, on the like recommendation, revoke any such declaration.

5. THE Governor may from time to time appoint such inspectors and other persons, with such powers and functions as he deems necessary to carry out the provisions of this Act.

6. IT shall be lawful for any inspector or any other person authorised in that behalf by the Minister, without notice, to enter upon any land for the purpose of ascertaining if any noxious weeds are growing thereon, and no such inspector or other person shall be deemed a trespasser by reason of such entry.

7. IF an inspector, or other person as aforesaid, reports to the Minister that any noxious weed is growing upon any land, the Minister may cause notice (a copy of which shall be delivered to the local authority of the District in which the land is situated) to be served upon the owner or occupier thereof

to clear the land and the adjacent half of any road within such time as shall be specified in the notice, and if any owner or occupier, after such notice shall have been served upon him, or left for him at his usual or last known place of abode, shall not, within the time specified in such notice, have cleared the land, every such owner or occupier being convicted thereof shall be liable to a penalty of not less than Five pounds and not exceeding Fifty pounds, to be recoverable before two or more Justices of the Peace in a summary way: Provided that, in the case of sheep or cattle runs, such notice shall specify as nearly as possible upon what portion or portions of the land the noxious weed is growing: Provided, also, that it shall be lawful for any such Justices to suspend any conviction upon being satisfied that the person so receiving such notice has used and is using reasonable exertion to destroy such weed.

8. IF there is no occupier of any such lands, then notice as aforesaid may be given by advertisement in the *Government Gazette*, and every notice so given shall be deemed and taken to be sufficient notice to the owner of such land, from the time of its being so published as aforesaid: Provided that it shall not be necessary for such notice to specify the name of any person as owner of the land therein referred to, and provided, also, that no owner of any such land shall be liable to any payment beyond the expense of, and occasioned by, the destruction and eradication of the said weeds upon such land, and upon such adjacent half of the road, as hereinafter provided, together with the costs of suit.

9. IF any such owner or occupier shall refuse or neglect to destroy the weeds specified in any such notice within the time therein stated, it shall be lawful for any person authorised in that behalf by the Minister to destroy and eradicate the same, and for that purpose, with sufficient assistants, to enter upon any lands in respect whereof any such notice shall have been given as aforesaid; and the Minister shall be entitled to recover from such owner or occupier the expense of and attending such destruction and eradication, together with the costs of suit by action or plaint in any Court of competent jurisdiction.

10. THE Minister may, on report being made to him by any municipal council or roads board, or the advisory board of the Department of Agriculture, that any noxious weed is growing upon any unoccupied Crown land adjacent to any freehold or leasehold estate, clear such land of such noxious weed.

11. AS between owner and occupier, the expenses of clearing the land of noxious weeds shall be borne as follows:—If the occupier at the time of the service of the notice has a right of occupation for six years or more, he shall bear the whole of the cost; if for four years but less than six years, he shall bear two-thirds of the cost; if for two years but less than four years, he shall bear one-third of the cost; but if for less than two years, the owner shall bear the whole of the cost; and either party paying more than his proportion may recover the excess from the other: Provided that any owner having only a partial interest, present, future, or contingent, paying a sum beyond what is proportioned to such interest, may recover the same from any other owner or owners, or shall be entitled to a charge on the land for such excess.

12. ALL expenses incurred in the administration of this Act shall be paid out of the moneys to be appropriated by Parliament for the purpose.

13. THE Governor may make regulations for carrying this Act into effect.

14. ALL penalties under this Act shall be paid to the Colonial Treasurer for the public use of the Colony.

In the name and on behalf of the Queen I hereby assent to this Act.

ALEX. C. ONSLOW, Administrator.

SCHEDULE.

Stinkwort (*Inula graveolens*).
Bathurst Burr (*Xanthium spinosum*).
Nutgrass (*Cyperus rotundus*).

NOTES.

BUSH FIRES.—In the January issue of the JOURNAL an article was published on bush fires, in which Section 7 of the Bush Fires Act was quoted. This having been repealed now reads as follows:—“Every person who shall wilfully or negligently set fire to the bush within any district or part of the colony during the prohibited time for that district or part, shall be liable on conviction thereof before any two or more Justices of the Peace, to a penalty not exceeding £50.”

DRAKESBROOK EXPERIMENTAL PLOTS.—We publish in this issue two plates of produce grown at the Experimental Farm of the Department of Agriculture at De Hamel, S.W.R. One is a photograph of a crop of pumpkins, the seed of which was obtained quite recently from South Africa. They are early, prolific, and large. The second illustration is that of a crop of runner beans (Powell's Prolific). These, newly imported from the United States, have made tremendous growth, and yielded in a strange climate, and out of season, coming from the northern hemisphere, a crop averaging a bushel per vine. The beans have a splendid flavour and are a most acceptable addition to our table vegetables.

TUBERCULOSIS IN HORSES.—The general opinion is that horses are not subject to tuberculosis, but that idea does not seem correct. It is not often that cases do occur, still there are quite a number on record, and the *Veterinary Record* quotes the following case:—The animal in question was a gelding 16 years old, and died in the usual course. A *post mortem* examination was held and the abdominal cavity was found to contain a large quantity of fluid, and further examination showed that the animal died of tuberculosis. How he had contracted tuberculosis was a matter of some mystery, as he had never been in close contact with any cows nor had he ever drunk cow's milk. The assumption was that the horse had contracted the disease through drinking at some trough or fountain, as the horse was principally employed in carting farm produce to the London markets.

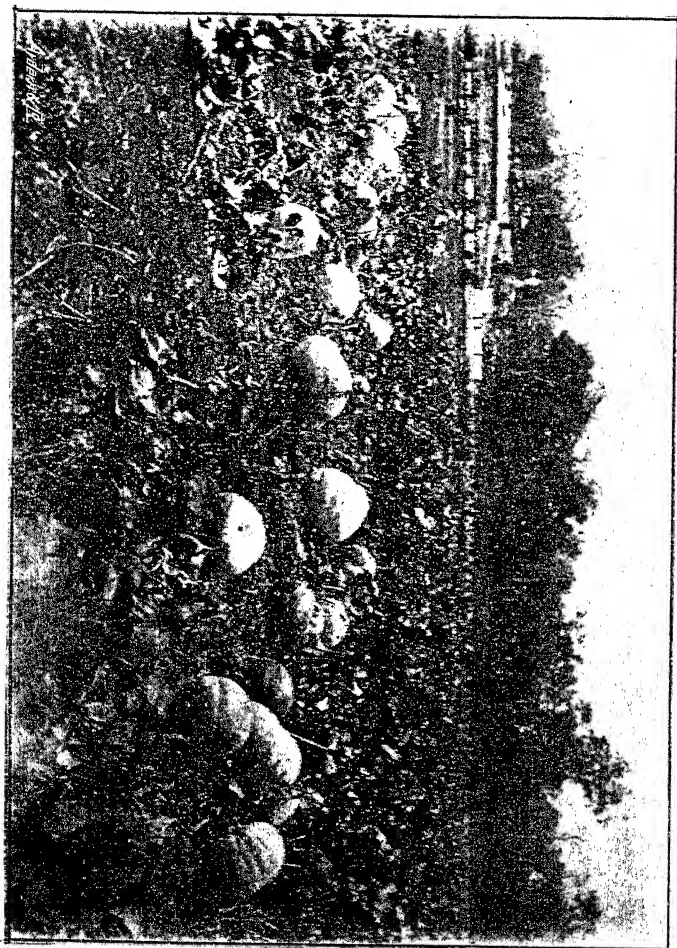
[NOTE.—This is a hint to women to stop kissing their pet horses on the nose. At the same time they might as well desist from caressing their favorite cats and dogs in the region of their mutual probosces if they do not wish to contract hydatids.—ED. JOURNAL.]

THE BEE MOTH.—Mr. A. Crawford, Dairy Expert to the Department of Agriculture who has just returned from visiting the Quindalup district, has furnished a report to the Secretary from which we take the following:—I visited some of the farms on the Ferguson River, and at one place examined some hives of black bees and introduced Italian Queens. The ravages of the bee moth in this district are just as bad as can be. Almost every wild bee in the district has disappeared, and the ones I examined were simply alive with grubs from the moth. Some of the hives

had been overhauled and cleaned only a fortnight before. On my opening them, in places the comb was stuck together with the web so that the bees could not get near the brood, all of which was dead. If bee-keeping is to be successful at all in this State, it is evident that only Italian, or bees with a good proportion of Italian in them, must be kept.

FRUIT FLY.—The Secretary of the Department of Agriculture has received a report from one of the Inspectors under the Insect Pests Act, in which he states :—"I have inspected all orchards between the ferry landing at South Perth and Canning Bridge, and only in one orchard did I find any trace of the Fruit Fly. The fruit growers are evidently exercising greater care than they did last year in combating the evils of this pest. Two other growers reported that they had found maggots in one or two peaches, but they had at once destroyed the fruit." In reference to the above it may be remarked that the district under notice was a nest of the Fruit Fly last season, and the report of the inspectors tends to show that by proper attention and the careful picking and destroying of all wormy fruit visited by the first brood of this fly, the ravages of the pest can, to a very great extent, be checked. Residents in the country districts are requested to at once communicate with the Department on the first sign of the Fruit Fly making its appearance in their particular district.

TIMBER REGULATIONS.—The Acting Conservator of Forests draws attention to the new regulations which have been issued prohibiting the cutting of jarrah of less than 2 ft. in diameter in all the forest districts. The closing up of timber areas after they have been cut out by the mills seems unnecessary, since the regulations prevent the taking of other than what might be considered the milling logs. The standard sizes at which the various trees may be cut within the south-west division, south of a due east line from Dongarra, are respectively as follows, measured at three feet from the ground, with the bark on :—Jarrah, 72 in. in circumference ; karri, 108 in. ; wandoo, 48 in. ; York gum, 48 in. ; morrell, 48 in. ; tuart, 60 in. ; sandalwood, 15 in. ; banksia, 18 in. ; sheoak, 25 in. ; blackbutt, 60 in. ; red gum, 50 in. ; yate gum, 36 in. ; salmon gum, 36 in. ; blue gum, 36 in. ; flooded gum, 36 in. ; paper bark, 36 in. ; native pine, 18 in. ; jam, 18 in. ; wattle, 18 in. ; peppermint, 18 in. ; native pear, 18 in. Sandalwood may be cut at 15 in. in circumference, three feet from the ground, throughout the State generally. Forest rangers are employed by the Department in all the south-western districts. Until recently the regulations applied to the whole of the State, but owing to representations from the goldfields and the north-west that the scarcity of the timber made them unsuitable there, the regulations were made applicable only to that portion of the south-west south of a line due east from Dongarra.



PUMPKINS, GROWN AT THE EXPERIMENTAL PLOTS, DRAKESTROOK.
(See Notes, page 81).

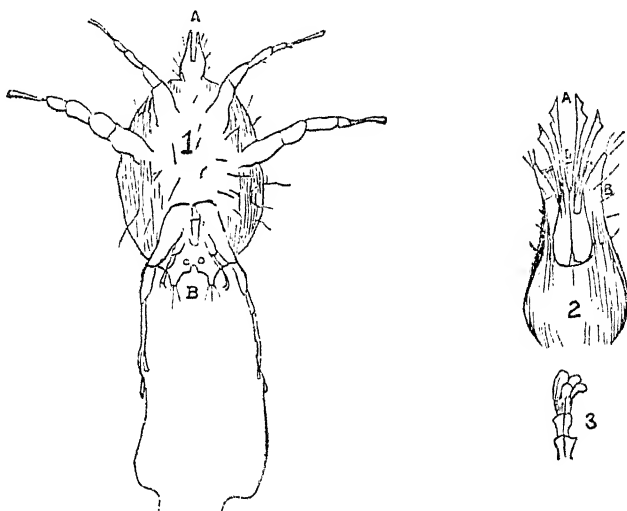
THE ARGENTINE CLIP.—The estimated number of sheep for shearing this season in the Argentine is given, according to the *Review of the River Plate*, as 80,000,000, less the estimated loss due to floods and disease of 15,000,000, or a net total of 65,000,000. These are calculated to produce an average of 3 kilos. (roughly 6½ lbs.) per sheep, less 10 per cent. for the ill-effects of sheep scab, &c., or a net weight of 175,000,000 kilos. This, at 2 dollars gold per 10 kilos., would give a result of 35,100,000 gold dollars, added to which 4,400,000 gold dollars as the value of the wool in hand, will bring out the estimated value of the Argentine wool crop at the low rates now ruling for the current year, 39,500,000 gold dollars, or, in round figures, £7,900,000. The estimated value of the present crop is based upon the very low values now ruling, which are about 50 per cent. lower than they were this time last year. The most notable feature of this estimated yield of wool is the enormous loss of sheep that has taken place during the past year amongst the flocks, a large proportion of which arises from the heavy floods last August and September, and the large reduction of the estimated weight of wool resulting from the damage caused by sheep scab.

SMALLER AREAS AND IMPROVED CULTIVATION.—A representative of the *Sydney Mail* recently interviewed a farmer of many years experience in the Goulburn Valley, Victoria. The farmer pointed out that some 15 years ago the land he is now cultivating had been very lightly cropped, portions of it having carried from two to six crops. At that time he cultivated a third more land than he does at present, yet, despite the fact that the land has been in use many years, his returns in bulk are heavier than those from a third larger area 15 years ago. He remarked that after rushing in as great an acreage as could be scrambled into the ground each year for some nine years, he suddenly came to the conclusion that at least one third of his labor and a great portion of his outlay was being absolutely wasted. Then he began to keep accounts, and his old balance sheets were very interesting. One of these statements, which the representative saw, showed the returns from 600 acres of wheat and barley. Of this crop 300 acres had shown a fair profit, 150 acres of old land made a dead loss, and 150 acres, sown later than May, a small loss. That and other balance sheets convinced the farmer that it would pay him better to put the whole of his efforts into cultivating good land, and the money lost on worn out and late sown into manure. This plan has been followed ever since with remarkable success. Our farmers may depend upon it that smaller areas, well cultivated, sustained with manures and sown in season, will give them the best returns, and the system will save them much toil, anxiety and loss.

DISEASES OF SHEEP.

BY PERCY G. WICKEN.

SCAB is one of the worst diseases that attacks sheep, but it has, fortunately, been almost completely stamped out in the Australian States. It is caused by a minute insect, too small to be seen by the naked eye. It burrows into the skin and produces intense irritation, and the wool begins to fall off. The tenacity of life in the parasite is so great that a scabby pasture has been known to spread the contagion after three years.



1. Male Scab insect, magnified. 2. Head of Scab insect, highly magnified. 3. Sucker at end of feet, highly magnified. A. Cutting mandibles. B. Horns or antennae.

Scab is easily known. Sheep affected with it are extremely restless, they rub against posts, bite and scratch themselves, and if not taken in time, their fleece will commence to fall off and they look ragged and wretched. If relief is not afforded a great number would die. Any dip used for prevention of scab must effectually kill the insect without hurting the wool or causing death to the sheep. A number of sheep dips are on the market for the purpose of dipping sheep for this disease. A good Australian wash is 1 lb. soft soap, 1 lb. tobacco leaves, and 1 lb. sulphur, to five gallons of water. The tobacco leaves are boiled in water for some time and then the soft soap and sulphur added.

Foot-Rot.

This disease attacks Merino sheep very severely when kept on rich, moist, and also on wet and low-lying pastures. All breeds are more or less subject to it, the Merino suffers one of the worst, and the Romney Marsh is almost free from attack. Foot-rot is an unhealthy condition of the wall and sole of the foot. There are

two kinds, one confined to the sole, and the other appears as a small eruption over the cleft at the heels, spreading downwards it attacks the wall and sole, and lameness is very marked. As the disease progresses the appetite fails, and the animal dies exhausted.

It is generally believed to be a contagious disease, and if sheep suffering from this disease are allowed to mix with a healthy flock, they will cause the disease to spread through the flock. It



1. Foot properly pared. 2. Diseased foot.
3. Foot badly pared.

is also caught if sheep are allowed to travel over ground that has recently been infected. The first symptoms will appear by a few of the sheep becoming lame; as soon as this is noticed the sheep should

be yarded up and the lame ones removed for treatment and the remainder run through a foot trough 12 or 15 ft. long, by about 12 inches wide, with 3 or 4 inches depth of liquid in it. Several preparations are to be obtained for the purpose, but a mixture of lime and water is recommended as being very effective; it should not be made caustic enough to harden the hoof or affect the skin. Another mixture is an ounce of arsenic to a gallon of water, a handful of salt being added to each gallon. The arsenic, salt, and water are boiled together for 6 hours before using. The diseased sheep should now be looked to and all the diseased parts and overgrown hoof should be pared away with a pair of hoof shears and a sharp knife, and all loose and diseased horn should be cut away, as it harbours dirt and prevents the dressing from getting into the hoof, but care must be taken not to cut into the foot so as to draw blood, as the careless use of a knife is likely to increase the growth of the troublesome fungus. Cleanse the foot of all dirt, maggots, etc., and apply a strong caustic to destroy the fungus growth. A strong solution of copper sulphate, about 10 lbs. of copper sulphate to 25 gallons of water is a good caustic to apply. Nitric acid and sulphuric acid are sometimes used, but great care requires to be exercised in their use.

After the feet have been cleansed by the caustics, the following healing dressings may be applied. They should be applied about once a week, or more frequently if necessary; they may be applied with a piece of rag tied to a stick.

Stockholm Tar	...	...	...	1 lb.
Melted Fat	...	...	...	2 oz.
Sulphuric Acid	...	...	...	1 oz.

Well mixed together.

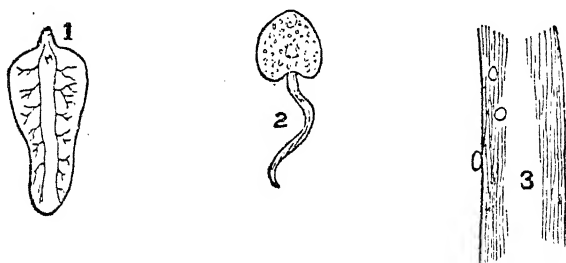
Stockholm Tar and Carbolic Acid, ... 20 parts to 1 part.
or

Stockholm Tar and Bluestone ... 4 parts to 1 part.

Fresh slacked lime sprinkled on a bare surface and arranged so that the sheep can walk through it is a convenient form of dressing, and is much less trouble than applying by hand. A liberal use of lime on the affected pastures is a good preventive.

FLUKE OR LIVER ROT (*Fasciola hepatica*.)

This disease is known in nearly all parts of the world. It is a parasitic disease caused by the presence in the bile ducts of the liver of the sheep of a small flat worm known as the fluke. It is of a light brown or flesh color, and varies when full grown from half an inch to an inch in length. It multiplies by producing eggs (one parasite may contain several thousand eggs) which look like brown granules to the naked eye. After leaving the sheep each egg gives rise to an embryo which enters a snail or slug, and there grows and multiplies, not by producing eggs, but by giving rise to germs within itself, these are known as sporecysts; they finally turn into Cercaria, which are flat oval bodies, with a tail like a tadpole; it swims about in the water holes and puddles, and attaches itself to the roots of grass, where it shakes off its tail and forms a cyst over itself, and if taken into the stomach of an animal with its food, develops larva fluke, which travel up the bile ducts and invade the liver, remaining there until completely developed; the results they produce depend upon the numbers and length of time they have inhabited the liver. At first they excite activity of the liver and hasten fattening so much so that butchers have been known to turn healthy sheep into diseased pastures in order to fatten rapidly. In very large numbers they produce an acute inflammation of the liver and rapid death.



1. Fully developed Fluke, as found on the liver. 2. Young Fluke insect, "Tadpole stage," highly magnified. 3. Eggs of Fluke on the stems of grass, magnified.

In chronic form they dilate the bile ducts and destroy the liver tissue till it appears rotten; this is shown by the dirty yellow color of the skin and eyes, we have also indigestion and general wasting and dropsical swelling of the abdomen and beneath the jaws. On a *post mortem* examination being made, the flesh is found to be pale, the blood watery, the liver spotted, caused by myriads of small flukes, and often the bile ducts are distended like yellow pipes.

Fluke may be introduced on to the land by manure, by the earth adhering to the sheeps' feet, by running water especially at flood time, and also by rabbits and other marsupials. On the first appearance of the fluke the sheep should be removed to higher and drier ground.

A good lick to supply infected sheep with is ginger, gentain and iron, in equal quantities.

Spirits of turpentine is very penetrating, and if mixed with cow's milk in the proportion of 1 to 16, and give 2 oz. of that mixture as a drench, it will have a good effect.

Prevention is better than cure, and our aim should be to try and prevent fluke, rather than to have to undertake the almost hopeless task of curing it. If the land is kept well drained and the sheep supplied liberally with salt and sulphur, there is not much danger of fluke. The best proportion is 8 lbs. of sulphur to 1 cwt. of Liverpool salt.

WORMS.

Sheep are very much troubled with worms, of which there are a number which attack them in different parts of the body. As a rule worms are temporary tenants, and only pass a portion of their life in the intestines of the sheep. Some pass through intermediate bearers, others live as eggs or larva in the water or among herbage, and in this form are carried about by travelling sheep and other animals. Country which is cold and clayey, badly drained, and hilly districts which are deficient in lime, are predisposing causes. Breeding ewes, lambs and weaners suffer most from worms.

The general symptoms of worms are : The sheep lose spirit and activity, suffer from thirst, keep at the rear of the flock ; they get thin and their stomachs swell up, the wool appears dry, harsh and dead, being deficient in yolk, the fleece is very open, the skin pale and dry, instead of being pink, moist and greasy. The eye appears bright and watery, with a pale mucous membrane. When doubt exists a sheep should be killed and the intestines examined.

LUNG WORMS (*Strongylus filaria*).—A small hair-like worm infesting the bronchial tubes, they block up the small tubes and air cells and cause inflammation of the lung tissue, panting and breathing with a harsh cough, and increased mucous secretion, which is often expectorated with some of the worms. Death is eventually due to the consolidation of the lung and suffocation.

Remedies : Fumigate the diseased sheep with sulphur, tar or iodine. Or, inject into the trachee an injection composed of carbolic acid, ten drops ; turpentine, half dram ; chloroform, quarter dram ; olive oil, one ounce, well mixed together. Repeat daily for three days.

TAPE WORM (*Tænia expansa*) is the common kind, very long and numerous, and when matured it casts off sections from its own body. These resemble maggots ; they contain numbers of ova ; and are thus distributed. The eggs enter intermediate bearers such as insects or carnivorous animals, and in them they develop into system or bladder worms, and are passed out ; they are then taken up by the sheep, and entering the stomach they develop into the tape worm. The tape worm is a long, jointed, flat, white worm.

from 1 to 30 feet in length, each segment is sexually matured. They do not injure the intestines, but live on the nutritive juices. They cause indigestion, diarrhœa and anæmia (water in blood).

The principal causes are wet, swampy land, and drainage is required as one of the first remedies. Remove the diseased from the healthy sheep, supply the sheep with licks and watch the lambs.

Liverpool salt is best spread in troughs, renew the supply two or three times a week, salt kills parasitic larva, and most likely the eggs. The best lick for general use is sulphate of iron and Liverpool salt, in the proportion of 1 to 20. The sulphate of iron is a good astringent, and acts on the red blood capsules and strengthens them, but if continued too long it constipates the sheep and deteriorates



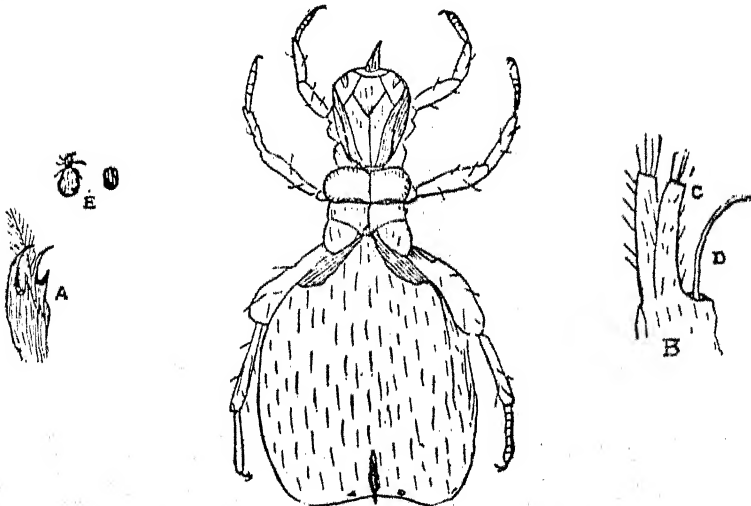
Method of Drenching Lambs.

the wool; it is best given in spring and autumn.

Other kinds of worm attack the brain and stomach of the sheep.

A good combined drench to administer for all worms is extract of male fern, $\frac{1}{4}$ dram; santonin, 1 grain; olive oil, 2 oz.; heat the oil and add the male fern and santonin, give drench while warm and on an empty stomach.

Oil of Terebene, 20 drops, is a good inter-tracheal injection for lung worms.



(In centre) Tick, highly magnified. A. Foot of Tick, highly magnified, showing the feathery appendage used to facilitate movement along the fibres of wool. B. Feeding apparatus. C. Feelers. D. Lancet used for piercing the skin. E. Tick and egg, natural size; the eggs are of extraordinary size in comparison with the parent insect.

Charcoal, iron and salt, is a good lick, 1 cwt. charcoal, 1 cwt. iron and 1 ton salt.

Another lick: Salt, 1 bushel ; air slacked lime, 1 peck ; sulphur, 1 gallon ; resin, 2 quarts.

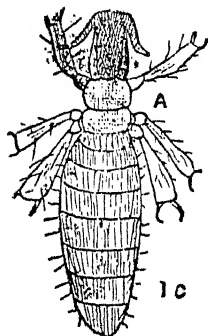
Whenever possible all licks should be placed under shelter and in a position in which the sheep can have free access at all times. It is also advisable to place in troughs in preference to placing on the ground.

TICKS AND LICE.

Although sheep troubled with ticks and lice can hardly be said to be diseased, they are still very much troubled with these

pests, and are kept in poor condition, and the wool is greatly deteriorated in quality.

Ticks cause the animals to rub themselves and tear and otherwise disturb their fleeces. If sheep are under-fed or in poor condition they are also certain to be attacked by ticks. Ticks are generally plentiful in timbered country, in mild and damp districts, and along the course of rivers and the coast line. The best remedy is to dip the ewes before lambing time, either in a solution of tobacco



A. Sheep Louse, highly magnified. B. Leg or Claw of Sheep Louse. C. Natural size of the insect.

and water, or with one of the patent dips which are to be obtained from the merchants. Lice generally attack the inner parts of the thigh and shoulders, the throat, neck and along the back. When lice are prevalent the sheep will often be found with the teeth matted up with wool from continually biting themselves. The treatment for lice is the same as for ticks.

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PIG-KEEPING.

By "AGRED."

III.

In many of the cases where pig-keeping has not been attended with profit, the cause is to be found in the management of the young pigs immediately after they have been taken from their mother. The Scylla and Charybdis are over and under feeding: digestive disturbances or stunted growth. Of the two the former is the more common and the less readily corrected. Yet there is no difficulty in maintaining constant and rapid development if the example of nature be followed. While suckling, the young pig receives its food in an available form, in small quantities and at frequent intervals, and if, instead of gorging the youngsters with a food to which they are not wholly accustomed once or twice each day, or restricting their quantity of nourishing diet, and attempting to supply by bulk what is denied in quality, feeding be conducted on the lines indicated, the result will be very different. For the first month or so after weaning the treatment accorded the young should vary but slightly, whether the pigs be intended for porkers or for keeping for breeding purposes. It is assumed, for the present, that the destiny of the pigs to be fed is the slaughterman's knife at the porker stage, and to give a clearer conception of the advantages of liberal feeding, a few remarks upon the theory of feeding will be useful.

The young pig is regarded as a pork-producing machine, and like other machines it requires a certain amount of food (the analogy between food and fuel being obvious) merely to run the machine itself, and until this is supplied no actual work is done. Suppose one pound of food of a given nutritive value is necessary to each of our pork machines to repair waste and support the vital functions for each day: suppose also, that 5 lb. of this imaginary food are required to produce 1 lb. of pork, and that it is desired to add 50 lb. of pork to each pig as cheaply as possible. If 6 lb. of the food be fed on an average per day, the weight will be added in 50 days: but if 3 lb. daily only be given, 125 days will be occupied in adding the 50 lb., and, therefore, 125 lb. will have been absorbed in keeping the machine going, while in the other case only 50 lb. were so employed, the difference of 75 lb. being practically wasted. Extend this over say 100 porkers and a very important leak with under feeders is discovered. It must be remembered that these figures are simply illustrative, and are not supposed to indicate actual ratios. Their office is to show that the sooner a pig being fed for a porker is pushed to the desired weight, the less loss there will be in food which is required merely to keep the pig alive. Simple as it seems to say feed the pigs all they will eat without disorganising their digestive apparatus, the whole art of pig feeding is the attainment of this apparently simple object. Close observation, constant attention

and experience are the only factors that will bring success. Rules and regulations, however useful these may be in a general sense, are valueless in actual feeding. The whims of the pigs (if they have any) will rule and regulate the management. Their tastes must be studied and conformed to, if they refuse to eat what is given them, they must be given what they will not refuse. Arbitrary measures like starvation diets and stick doctoring may gratify the spleen of the man, but it is at the expense of his pocket. It is fortunate that under proper management the pig is never of whimsical appetite: it is the improperly fed pig that sulks over its food and roots contemptuously at the contents of its trough, and this, not because of any mental obliquity on the pig's part, as many seem to suppose, but because the stomach of the pig rebels against the food before it.

Some of the causes of this rebellion will be evident when feeders grasp the idea of a balanced ration. Food stuffs contain three main constituents: albuminoids, fats, and carbo-hydrates, and are described as albuminous, fatty, or carbo-hydrate foods, according as the percentage of these constituents is high in the particular food. As somewhat detailed consideration has been given to feeding stuffs previously in these pages, it is assumed that the reader is familiar with the properties of the constituents of foods. Now, as no one food has the nutritive constituents in such perfect proportion that growth can be properly made on its exclusive use, it is apparent that one of the first requirements of a well-balanced diet is a mixed ration. Accordingly we find British pig farmers carry this mixed dieting to extremes, and supply such mixtures as wheat, oats, barley, maize, in various proportions, while peas, oilcakes, or some of the many "meals" on the British market may be substituted for some of the grains or even added to the mixture. Whether there is any necessity to go to this length in preparing foods to secure the best results is a matter of opinion, but it will always be found that some mixing is highly beneficial. It is here that the knowledge of the proportionate constitution of foodstuff is necessary for the benefits of mixing will probably be lost if two kinds of foods, each containing an excess of the same constituents, are mixed. Foods of high albuminoid content should be mixed with those in which fats or carbo-hydrates predominate. In preparing the food for porkers a comparatively high albuminoid ratio is desirable to afford the necessary ingredients to promote growth in proportion to creating fat, yet care must be exercised to keep the albuminoids within safe limits, since if fed in excess, internal disarrangements, known by some as nitrogen poisoning, are occasioned. In selecting food mixtures the season should be taken into consideration, preference should be given in summer to sources of albuminoids as peas, beans, etc., and in winter to cakes in which a high fat content is combined with a good albuminous content.

It seems advisable to here remark that there is a distinction between a mixed diet and a change of diet. Many feeders seem to

think that a change of diet is beneficial to pigs. This is an error. The assimilating arrangements of pigs become accustomed to operating on a certain class of material, and to suddenly give them an entirely different food is to break the continuity of the functions. From food sickening, through badly conducted feeding, a change in the diet may be sometimes necessary as being the less of the two evils, but under proper management no such cause is needed to keep the pigs eating voraciously and gaining rapidly in weight.

We will now come to the actual care-taking of the weaners to be pushed along toward slaughter.

Where pasture can be given the weaners, the best results are more easily obtained than under the more artificial systems of sty feeding. There will be less likelihood of disturbance in the digestive organs since the pasture will provide the natural counteragent with which pigs instinctively correct functional disorders. As most porkers have to be fed in confinement through lack of pasturage, and as during the severe months of winter the most profitable results are often obtained when pigs are housed in warm quarters, it is supposed that all food is hand fed. This again affords inducement to pushing the pigs along to the desired weights as the labour and time occupied in feeding will be reduced. Three or four pigs should be placed in a pen roomy enough for them to have a gambol in when so disposed. 10 ft. x 10 ft. is a useful size. Plenty litter, for the sake of cleanliness, to absorb the valuable liquid manure, and in winter to afford warmth, should be supplied. In one corner of sty a box containing a mixture of soil, charcoal and ashes should be kept, and the amount of this which will be consumed by the pigs is astonishing. Some such material is very necessary to highly fed pigs, and must not be given the secondary place some ascribe it. It prevents souring of food in the stomach and consequent food sickness. The newly weaned pigs should be fed every three hours while daylight lasts, and probably for the first fortnight a warmed feed at 10 o'clock at night would repay the trouble involved. Gradually the time between feeding should be lengthened and the quantity increased until three feeds limited in quantity only by the capacity of the pigs should be given. This is to be continued until they attain the required weight. The different foods used may be either mixed together at each feeding or fed alternately, according to circumstances. If pollard and oilcake, for instance, are employed, they should be fed together; while if peas are substituted for cake, they should be fed separately and alternately. The question of cooking foods for pigs is a very vexed one, and will be considered later. Where conveniences and time permit, the food for newly weaned pigs should be prepared previously by being scalded with boiling water; peas should be soaked 24 hours before feeding. This applies more forcibly to styed pigs than to pastured ones, as the former are more readily upset. The translation from cooked food to uncooked must be accomplished gradually, by mixing

gradually increasing quantities of the raw food with the cooked to permit of the young pigs getting accustomed to the new diet. This gradual alteration should be followed in all changes of diet. A little pure bone-dust or bone superphosphate is a useful addition to vegetable foods, and assists greatly in reducing the cost of production. Salt should be mixed with the food, and an occasional spoonful of sulphur for each pig is useful in maintaining healthy vigor.

If this system be thoroughly followed out—parenthetically it may be said that if not the pigs may eat their heads off—at four months from the birth of the pigs the farmer will have a number of porkers of the first quality for butchering: a quantity of manure roughly valued at one-third the market value of the foodstuffs and a profit of from 50 to 75 per cent. on his turn over, assuming he purchases his foodstuffs. No mention has been made of green-stuffs in pushing the porkers along. These may or may not be used, as circumstances determine. It is questionable if they are worth the labor of carting and feeding to porkers, the most profitable employment of such being to brood sows, &c., where rapidity of progress is unnecessary. The same applies to the use of roots—excepting, perhaps, potatoes, which may profitably be cooked and fed in conjunction with richer foodstuffs. Many people buy a weanling pig and imagine it will thrive and grow well on garden waste. The breed of pigs that will do this is unknown to the writer. True, ragged development may ensue, but results in inferior pork, a profitless pig, or if required for breeding purposes, a stunted, ill-developed parent unfit for producing profitable progeny.

To revert to the treatment of pigs destined for other than porkers, whether for baconers or breeding purposes. These, as was said before, should receive the same treatment as the porkers for the first month, subsequent to weaning, for it is necessary to future development that they should be carried safely over this very important period in their lives. After that there is nothing so economical, and so conducive to frame development, as affording these pigs a good pasture and assisting them with a morning and evening meal of good food. Where sty feeding is compelled by circumstances, sufficient food to maintain fair condition on the pigs is all that is required, and use of garden and farm waste, in fact anything the pigs will eat, supplemented by a medicine of rich food, can be profitably made. Steady progress, not necessarily rapid, is what is required here, and foods that tend to fat production are to be avoided. Leguminous crops, fed green or in the hauling state, are excellent for this purpose. The only point which need be enforced is regularity in tending. However slow the progress of the pig towards maturity may be, no check must be allowed to occur. It is often very difficult to start development when once it is arrested.

THE INSECTIVOROUS BIRDS OF WESTERN AUSTRALIA.

BY ROBERT HALL.

FAIRY MARTIN (Bottle Swallow).

Petrochelidon ariel, Gld. (*Pet-rō-kel' i-don; 'ari-el.*)

Petros, a rock; *chelidon*, a swallow; *ariel*, a sprite.

Collocalia ariel, Gould, "Birds of Australia," fol., vol. ii., pl. 15. "Key to the Birds of Australia," Hall, p. 47 (1890).

GEOGRAPHICAL DISTRIBUTION.—AREAS 9, 7, 6, 5, 4, 3.

KEY TO THE SPECIES.—Under surface whitish; throat with tiny black streaks; entire head rufous; rump creamy-white; tail forked; nostrils without any superior membrane, round and exposed.

If the winter is mild many flocks will stay in the Southern districts throughout the year, but as a rule they prefer to migrate north before the end of April. By this method the cold weather is avoided, and in spring they return to the south. Although fond of plenty of water, a company will associate their nests in an almost dry creek bed and live in the vicinity of it. From here they daily forage and do well. The generic name originally given was at the time specially applicable. [*Lagenoplastes* (*lagena*, a bottle or flask).] The birds build bottle-shaped nests made of mud, and have them upon the cliff or under a bridge until 10 to 40 are together. This makes up the colony, to which they annually return. Work is carried on in the cool of the day—morning and evening. Half a dozen birds will help to build each nest (grass and feather lining), about 3 to 7 inches apart, and if, at any subsequent time, you should break off a neck, the whole colony immediately starts repairing it. In less than 15 minutes several thousand mud "bricks" have been carried and plastered together, and order has been restored. It is said one bird remains to receive the pellets and complete the inside wall. Mr. Price Fletcher in a private diary says:—"Unfortunately this curious and closely constructed home is no protection against some of its feathered foes, for I have seen the Red-rumped Kingfisher, instructed doubtless by its habit of breaking into the tree-ants' nests in order to make a nesting place for its own eggs and young, make persistent war on the colonies of Fairy Martins. The Kingfishers fly up, catch the end of the neck or entrance spout in their beaks, and gradually break it off until they reach the eggs or young, which they ruthlessly devour. I have known the pretty little Pardalote or Diamond-bird, which usually builds a nest at the end of a tunnel 2 feet long excavated in some sandy tank, deliberately take possession of one of those spouted nests of the Fairy Martin, and hold it against all opposition from its original constructors, and safely rear a brood of young."

In another case I know of an introduced sparrow that took possession of a nest that was about being completed by the Martins. As this sparrow absolutely refused to leave the nest, the Martins mudded it in. My friend released it. The name, Swallow-Sprite of the Rocks, is well applied.

Nest.—Made of mud, with a neck to it that is retort-shaped, the funnel extending from the bowl several inches; the inner lining is made of grasses and feathers. A colony of nests is placed under a bridge or on a bank, an illustration of which appeared in the last issue of the JOURNAL.

Eggs.—White or white spotted with tawny brown; the spots may be distributed over the egg or at the larger end only. Three to five generally for a sitting. Length, 0.7 inch; breadth, 0.5 inch.

TREE MARTIN (Tree Swallow).

Petrochelidon nigricans, Vieill. (*Pet-rō-kel' i-don nig' ri-kans*).

Petros, a rock; *chelidon*, a swallow; *nigricans*, blackish.

Collocalia arborea, Gould, "Birds of Australia," fol., vol. ii., pl. 14. "Key to the Birds of Australia," Hall, p. 47 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas.—9, 7, 6, 5, 4, 3, 2.

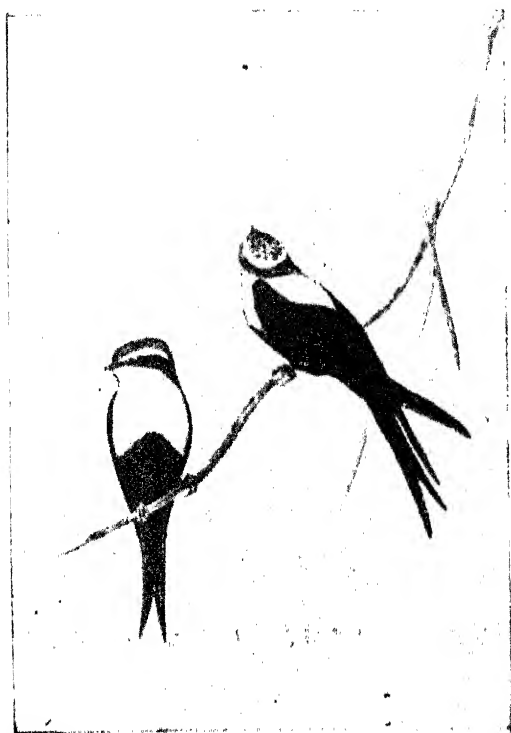
KEY TO THE SPECIES.—Under surface whitish; throat whitish, with tiny black streaks; frontal band sandy buff; rump whitish-brown; tail forked; nostrils without any superior membrane, round and exposed. The present species congregates in flocks.

Of every hundred intelligent people who see martins in the woods or near bridges, I feel sure ninety-eight never distinguish it from a second martin of the genus (*P. ariel*, Gld.) That is because there is practically but one difference, and in the distance not discoverable without field-glasses. One has the forehead rufous only, the other has the forehead and crown rufous, each characteristic being always constant. Both have similar ways, and very often occupy the same nature of surroundings. *P. nigricans*, breeds in holes in trees, while *P. ariel* prefers creeks and cliffs against which to build, or bridges, under which they colonize and nest. In a way it is a migratory bird, leaving the heavily timbered southern lands after February and returning in September. Being strictly arboreal, it hunts in flocks, feeding largely upon micro-insecta. In this respect it is invaluable as an insect exterminator, functioning as few other birds than swallows can do. When each ninth or tenth generation of the aphids comes into existence the birds display wonderful activity among the winged insects.

Nest.—A hollow of a tree, with decayed wood as a base.

Eggs.—Three to a clutch; slightly spotted with reddish-brown at the larger end. Length, 0.75 in.; breadth, 0.5 in.

BLACK AND WHITE SWALLOW (White-breasted Swallow :
Tunnel Swallow).



Cherameca leucosternum, Gld. (Ker-a-mê-kâ bu-ko-ster' num).

Cheramos, a hole; *oikos*, a dwelling, *leukos*, white; *sternon*, breast bone.
Cherameca leucosternum, Gould, "Birds of Australia," fol., vol. ii., pl. 12. "Key
to the Birds of Australia," Hall, p. 47 (1899)

GEOGRAPHICAL DISTRIBUTION. — Areas 9, 7, 6.

KEY TO THE SPECIES. — Cheeks, throat, fore neck, breast, mantle and upper
back, white; crown of head, white, with brown centres to feathers; rump,
upper tail coverts and abdomen, blue-black; tail, forked; nostrils, open
and exposed, with scarcely any superior membrane.

The present species keeps in low latitudes, being fond of hot
weather. Except in nesting season it may be well said to be a
high flying bird, but at that time it descends to the ground and
keeps a "vigil" of its home and family. This it does for weeks
during October and November. At Geraldton I have dug into
cliff sides and found eggs at the inner end of the tunnel. Thus the
bird, as its name implies, is a white-breasted dweller in a hole.

So tame is it that you may cut open the entrance and work right into the bowl cavity before the little bird within will attempt to fly. A high bank will contain several isolated tunnels, but they are not all in use as shelter for the separate clutches of eggs. Some serve as nesting places during the night for the non-sitting birds, and it is not improbable several parents which are not at that time engaged in incubating the eggs, camp together. They form a community of birds, and in their unity find a strength of comfort in the night for which they do not seek in the day. It is known that a pair only is generally seen in the day, while as many as five have been caught in the one hole at dusk. The nesting hollow is not confined to an earthen bank, as a hole in a tree lately occupied by a small mammal is occasionally turned to account. Hence the name *Boo-de-boo-de*, applied by the mountain district aborigines after a species of *Bettongia*.

One often hears of Boodee holes, though I cannot realise that the swallow would locate itself anywhere but on the confines of the mountain districts. Like the Swifts, this species is rather solitary.

Nest.—A slight cavity in a tree or at the blind end of a short and narrow tunnel into a cliff bank. This may or may not be near water. The bowl only sometimes contains a few dry grasses, which serve as a base for the eggs.

Eggs.—White. Generally five to a sitting. Length, 0.7 in.; breadth, 0.6 in.

MOSQUITOES AND MALARIA.

The following, which appeared recently in an Eastern paper over the *nom de plume* of "Puyyaka," is particularly interesting from an hygienic point of view, and its publication, it is hoped, will be of service to those living in low-lying districts and cultivating our rich swamp lands:—

"The recent experiment of two doctors in the Roman Campagna appears to have conclusively proved the mosquito-causation of malaria. For three months of the malarial season these men lived in a hut in the worst part of the Campagna, took no quinine or other febrifuge, spent the day in the open air, and went withersoever they would amongst the fever-stricken inhabitants. With them they had two Italian workmen who followed their ordinary avocations during the day, returning to the hut before sundown. The only precaution taken was to render the hut perfectly mosquito-tight with fine wire netting. Doors and windows were otherwise left freely open and the ordinary food and water of the locality were used, the latter filtered and boiled. None of these four men evinced the slightest trace of malaria during or after these three months, and periodic examinations of their

blood showed no trace of the easily-recognisable malaria organism. In their published report these doctors confirm the supposition that malarial fever is caused through the agency of the *Anopheles* species of mosquito, which is very rarely seen by day, though extremely active at night. There is now, therefore, little doubt that the existence of malarial fever is solely dependent upon the presence of the insect, and that its introduction into a healthy district will be followed by malaria. Elephantiasis also undoubtedly depends on a variety of mosquito, and its recent introduction to the South Pacific is coincident with the importation of the insect in question by shipping. The *Anopheles* may exist within very wide boundaries of latitude, and with the modern rapid means of transit the introduction of malarial diseases may yet form a very lively problem for the public health authorities of the Southern States of Australia. During the experiment of Lambori and Low, they sent to the Liverpool School of Tropical Diseases a number of the live specimens of *Anopheles*. Dr. Mason, a healthy young man, who had never had malarial fever, allowed himself to be bitten by these insects, and duly developed a typical attack of tertian malarial fever, which ran its course as uncompromisingly as if he had been in the Indian Terai instead of Liverpool! Such an experiment is absolutely convincing. We have plenty of malaria in the North of Australia, and the evolution of a species of *Anopheles* capable in standing colder climates might make a very serious difference of Southern affairs. Some Cuban army-surgeons, by the way, have recently demonstrated that yellow fever can be transmitted per the versatile mosquito. Plague, cholera, and other virulent tropical diseases are suspected to have an intermediate connection with one or other of the lower forms of life, and the writer is strongly of opinion that the true solution of the cancer problem will be found to lie somewhere in this direction. It is easy to airily dismiss the subject as a medical fad. Fads are not tolerated among the keen-witted leaders of modern science, and irrefutable proof has already been given of enough instances of insect-transmission to make it probable that we are on the edge of a very big discovery indeed. For the present, however, the resident in malarial localities will do well to shun the attention of a largish grey and black mosquito, who stands very much on his head while inserting a well-developed proboscis, and who is excessively active after sundown. And to do this he may begin by kerosening all ponds and puddles near his home at the rate of about one tablespoonful to the square yard each week; for it is here that the enemy lays its eggs. The use of fine wire-screens for all openings in the house walls—including chimneys—is difficult, but a mosquito net is essential, even though kerosene and wire screens are not obtainable. In camp many things have been used for causing a smoke, but the result of a number of experiments made in Africa show that a mixture of cow-dung and coarse native tobacco is the most effective. But, above all, the mosquito net."

AN OLD BREED OF BRITISH SHEEP.

It is a strange feature in British live stock husbandry what a strong vitality many of the old breeds possess. Often when some ancient breed is named the remark is hazarded, "It is now extinct." Such was the case with the long-horned breed of cattle, at one time so highly esteemed by British husbandmen that they were regarded as very formidable rivals to the shorthorns. It was said at the time that it was fashion and not merit that gave the premier-ship to the shorthorn. As the latter advanced, the longhorns declined, till they were believed in England to be extinct. To the surprise of most stock breeders the longhorns have come again, and their undeniable merits are bringing them into favour. One of the old breeds of British sheep was the Clun Forest breed, which was described by old writers as an indigenous breed. Like the longhorn cattle, the Clun sheep have come again into evidence, but unlike them, it is not as a pure breed, but as a cross. The old tan-faced sheep of the Clun district of Shropshire and the neighbouring parts of Radnorshire and Montgomery have been crossed with Shropshire and (some say with) Longmynd Mountain rams. The new variety have almost supplanted the Longmynds, and the remains of the old tan-faced Clun Forest sheep. The modern Clun sheep is a brown-faced variety, and resembles the Shropshire, but is smaller, and retains most of the best qualities of the old breed, from which it derives its hardy constitution and ability to grow and thrive upon a somewhat bare pasture. The *Live Stock Journal* describes these sheep as "possessing abundance of lean meat of fine quality, and but little known out of their own district." Where quality of mutton is a consideration, these sheep are prized, and they are excellent for lamb-raising, being remarkably good mothers.—By "Bruni," in *The Australasian*.

On referring the above to Mr. Wicken, of the Department, he says:—"There is a saying, 'There is nothing new under the sun.' When we hear of a new breed of animals or a new vegetable, it is generally only an old variety, perhaps a little improved and under a new name. The Clun sheep had its origin in a cross between the yellow-faced Clun Forest ewe and the Shropshire ram. It is a brown-faced animal resembling the Shropshire, but smaller, and still retains most of the best qualities of the native breed. From this it derives its hardy constitution and ability to grow and thrive upon a somewhat bare pasture. It is not such a good sheep as the Shropshire, and its principal use is to cross again with the Shropshire to obtain early lambs. While we can obtain Shropshire and Dorset sheep for this purpose we need not trouble about such little known breeds as the Clun sheep. These breeds of sheep, and also the Long-horn cattle mentioned, are very well to use when a new strain is required in a flock that has been suffering from in-and-in breeding, but as a pure breed of stock to keep for profit they are best left alone."

PARAGUAYAN TEA.

The Secretary of the Department of Agriculture is now making arrangements for the importation of seeds and plants of the *Ilex paraguensis*, the tree or shrub that produces Maté or Paraguayan Tea, samples of which will be distributed in the most likely places of the State for experimental purposes. The Government Botanist, in reporting on the plant, says:—

“*Ilex paraguensis*, the tree or shrub that produces Maté, or Paraguayan Tea, is a native of Southern Brazil, Northern Argentina, and Paraguay, and having grown fairly well in the Melbourne Botanic Gardens, according to Baron Mueller, it ought to find a suitable home in many parts of this State, in the N.W. and S.W. divisions.

“The yerbaes or yerba forests are mostly in the possession of capitalists and companies, and an export duty is charged on the produce, yielding in 1895, 471,668 dols. (£16,845.) The total quantity of yerba maté exported during 1896 is estimated at about 9,024 tons, and its average price per arroba (25 lbs.) was 11 dols. 50 cents. paper (7s. 8d.) The export from Brazil is much larger, that from the province of Parana alone being over 36 million pounds in 1871, and the local consumption is very large. The tea is sold in Rio de Janeiro at 5d. per lb., and has found its way to Europe, especially to England, but it cannot be said to be as yet in general use. The plant contains the same restorative chemical principle as the true tea and coffee, and is said to be also a stimulant, with a special action on the skin or kidneys. It is much cheaper than tea or coffee, but where every consumer of these beverages is more or less of a connoisseur it will take some time before the yerba maté succeeds in displacing them.

“The plant appears to be quite hardy, and rooted specimens should safely come from Ceylon, in closed cases at least. Planting out would probably be best done with the first autumn rains or early in spring; but, in the tropics, at the commencement of the rainy season. Mr. Bernays, of Brisbane, says:—‘Paraguay tea appears to possess all the good qualities of the common tea, with the great additional advantage of simplicity of cultivation and preparation. The plant grows well in Brisbane and all along the northern coast, and is easily propagated by layers and cuttings. It does not seem to be at all exacting as to soil.’ Most of the tea in Paraguay is obtained from wild plants, though it is also cultivated to a limited extent.”

NOTICE TO CONTRIBUTORS.—The Secretary, Department of Agriculture, will be pleased to receive contributions for the JOURNAL on agronomic subjects generally. These should be brief and to the point, and written on one side of the paper only. Reports on the state of crops and stock and produce movements in the various localities will be much appreciated.

THE HONEY BEE.

By R. HELMS.

LIFE HISTORY.

I.—THE DIFFERENT MEMBERS CONSTITUTING A COLONY.

To become expert in the art of bee culture it is necessary to be thoroughly acquainted with the life history of the insect, as also with the special functions assigned to the organs of the structurally varying members of a bee family. Without a clear conception of the phases of life and the interaction of the differently constituted individuals upon the whole community, a bee-keeper will for ever remain a mere dabbler, and will always be liable to bungling. The highest art in breeding is attained by closely imitating nature, but in order to do this successfully it is necessary to carefully study nature's phenomenon.

A community of bees is variously termed a colony, swarm, and frequently also stock or hive. The two latter terms apply more correctly to the artificial dwellings of the bee, but by conventional habit of speech it is understood to mean a large assemblage of the insects as well. A colony is in reality a large family including many thousand members, most of which are sisters, and the offspring of the same mother. But periodically there are also male bees met with among them. This, however, generally only occurs in the early part of the summer, when through increased vitality an impulse arises in the family for a portion of it to migrate, which is commonly known as swarming fever. Such migratory instinct is much stimulated by a rapid increase, when, in order to avoid over-population, it becomes necessary for a number to leave the hive and seek a new home. At such time males are produced for the fertilisation of the future mothers, which are still unhatched when the old one leaves with the swarm.

With the honey bee three distinct physiologically differentiated creatures are necessary to propagate the race. Still, as with other animals, only two sexes occur. The vast number of bees seen constantly emerging from and entering the hive are neuters—an application objected to by many writers as not being strictly correct. These so-called neuters are the working masses of the community, and are in reality females with aborted sexual organs. Through some extraordinary influence acting upon the immature young, their sexual organs remain only partially developed, and in their place they become possessed of certain physical features not found in the true sexes. Although this abortion of the sexual organs has made it impossible for these bees to be themselves reproductive, their maternal instinct is no wise diminished, and is, in fact, developed to an extraordinary degree. Were it not for their devoted attention to the young, the community could not prosper.

The three different bees are known as the queen, drone, and worker. The queen is a perfect female as regards her sexual organs. The drone is in the same manner a male. The worker, or so-called neuter, is a sexually imperfectly developed female.

The queen, owing to her great laying power, is generally regarded as the most important member. It is true a fertile queen may soon increase the number of workers, and transform a weak into a prosperous colony, but she could not have done this without having been first fertilised by the drone. Nor could the brood be reared without the help of the foster mothers, the workers. When it is considered how the different elements which constitute a colony depend upon each other, and how their functions interact with one another, it becomes obvious that none deserve to be called the "most important." Without the one the other could not exist for long, only the male members may be dispensed with periodically, because their influence, when once manifested, is of extraordinary duration.

THE QUEEN.

The interesting member of a bee colony, now generally known as queen, was formerly also called king or leader (Weisel or Weiser, *German*). This was before her sex had been recognised, and no doubt arose from the fact that she appears singly among a great number of other bees and receives considerable attention from them. She is, in reality, during the early part of her life, the sister of the workers and drones, and later the mother of all who surround her. Her true position is that of mother-bee, and her importance begins after she has been fertilised. The term king originated in antique times, when she was thought to be a male, and the supposition that she possessed monarchical power and influence gave rise to this name. In no sense, however, does she exert monarchical power, nor can she be called a leader, for she does not lead, but, on the contrary, is led by her children. These, well knowing that upon her depends the reproduction of their numbers, and consequently the future welfare of their family, tend to all her wants and display the greatest filial attachment towards her. A number of workers constantly surround her, and according to the desire of greater or lesser increase, which is regulated by the flows of nectar, and the season, she is supplied more or less abundantly with food. Consternation seizes the offspring should the mother be lost through death or accident.

Soon after emerging from the cell the young queen leaves the hive a few times on fine days and circles about over it for the purpose of getting acquainted with the surroundings, and then, under the sexual instinct, flies off one warm afternoon to meet a drone. The mating flight generally takes place on the fourth day after the queen has emerged from the cell, but sometimes earlier, and frequently later, if prevented by inclemency of the weather. If delayed for more than 20 days fertilisation rarely takes place, and in that case the queen becomes a "drone-mother." She is

generally successful in accomplishing her desire, and when she returns, after her nuptial excursion, she does not voluntarily leave the hive again. After coition her ovaries develop rapidly, and in a few days she begins to lay. The power of oviposition grows considerably for some time, and when it is at its height she may lay as many as 3,000 eggs daily. Considering that the average life of a queen is about three years, and sometimes extends to over five, it is possible that she may lay over a million of eggs during her lifetime. She is one of the most prolific insects known. The laying of eggs is the important function of the queen.

THE DRONE.

The function of the males is solely that of fertilising young queens. The excessive number of drones always present in a strong colony during the summer has been a puzzle to naturalists and still more to bee-keepers. By some they were considered defenders, others maintained that they assisted in keeping the brood warm, and others again believed them to be water carriers, and that they also probably assisted in ventilating the hive. The fact, however, that they lack the defensive organ of the other bees—the sting—makes the drones quite harmless. And as regards keeping the brood warm, this supposition falls to the ground, because they appear mostly in summer when the brood does not require to be constantly covered. During early spring when warmth is most needed in the hive they are generally not present, or only in the larvæ stage, and require external warmth themselves; and towards autumn they are, as a rule, driven out and perish. Except when a colony should become queenless late in the season, the drones are spared, and may at times even be allowed to live through the winter. That part of their function is to provide water or keep the hive ventilated is likewise a mere supposition. In fact, when in the hive the drones do nothing but eat, most of the time allowing the workers to feed them. For what purpose, then, are so many as sometimes over two thousand produced by a vigorous colony? It is all important that the young queen should be fertilised soon after she becomes mature, and as the act of coition must take place while on the wing, and at a considerable height in the air, it is necessary that there should be many drones available to ensure her meeting one when issuing on her wedding flight. But another more important fact must be considered. When a young queen ventures out for a marital embrace she will, as likely as not, meet one of her brothers, under natural conditions, probably, as a rule. This might lead to deteriorations of the race were it not that in the competition for her possession the strongest and swiftest has the best chance to achieve the desire. To secure a prompt fertilisation by *natural selection* combined with *sexual selection* the large number of drones are provided. This view corresponds with the general law of nature. The importance of the drones is enhanced by their numbers. Probably no more

than one out of upwards of a thousand copulates, but then his virility may assert itself for upwards of five years.

THE WORKER.

The name "worker," given to the great mass of bees found in a colony, is perhaps the most correctly and justly applied. It is in no way misleading like that of queen, and not derived from a mere peculiarity as that of drone (because the male, owing to the much greater expanse of wings, hums much louder than the rest when flying). The worker has to do everything except reproduce the race.* This they are unable to do owing to their aborted sexual organs, which has suppressed their sexual desires without impairing their love for the young. The queen produces the young, but cannot rear them, and this the workers do with a zest that is without parallel. They divide, so to say, with the real mother the labour and pleasure of maternal care. The welfare of their immature sisters absorbs their whole being. They toil incessantly for the young, and sacrifice, in fact, their lives for them in every sense of the word. Their work begins a few hours after they leave the cradle, and only ends with death. During the first ten days or so they tend the larvæ, seeing that everyone is supplied with the proper nutrition. For this they are best adapted at the early age of maturity, owing to some physiological characteristics. Whilst engaged in this duty they do not fly, except for a short period during the warmest part of the day, round about the hive getting exercise (play), and at the same time making themselves acquainted with their environments. In due course the sealing of the cells over the full grown larvæ has to be attended to, and during the progress of these various operations they cluster more or less thickly on the comb for the purpose of keeping the brood warm. All insects being cold-blooded, sufficient warmth can only be created by them through continued agitation. The bees staying at home engaged in the before-mentioned work are more particularly called "nurses."

Meantime the older bees, also called "foragers," are busy bringing pollen and honey, which is transferred to the nurses for immediate use, or stored in cells handy to the brood nest. These provisions are in several ways elaborated into food for the larvæ. To further liquify the honey and to separate the agglutinated pollen grains considerable quantities of water are needed, which are brought to the hive as required. Feeding, moreover, is not merely needed for the development of the larvæ, but this task requires also to be extended to the queen and the drones, and particularly whilst the queen is laying she has to be provided with large quantities of a nitrogenous substance. During the period of her greatest fertility the weight of the eggs deposited per day

* As the ovaries are not entirely absent, but merely atrophied in the workers, some, under exceptional circumstances, are able to produce eggs. This abnormal phase will be discussed later on.

amounts to more than three times that of the body of the queen. To enable her to balance this exhaustive process, she requires to be supplied with rapidly assimilable food. This the workers elaborate in their bodies and secrete in minute globules, through glands situated near the mouth. The constantly changing retinue which surrounds the queen when laying, escorts her for the purpose of supplying food to her. The addition and diminution of food re-acts upon her laying power, and is entirely regulated by it. In order to stimulate their virility the drones also require to be fed with nitrogenous food. This the workers produce and supply in the same way as with the queen, and the early stage of the larvæ.*

Another important duty is the building of the combs. Without these the young could not be reared nor food stored. When a swarm takes possession of a new home the first work is the construction of new combs, which sometimes proceeds with marvellous rapidity. After a few weeks, when young begin to crawl out, their cradles require to be cleaned and thoroughly smoothed inside, to receive another egg almost immediately. When thousands mature daily many are kept busy with this work. Partly for protection against enemies as well as against draught, and to keep the light out, every chink and crack is plastered up. This is done with propolis, a resinous substance, gathered specially for the purpose. A number guard the entrance against intruders, and often combats occur to keep aggressors out of the hive. Everything of an obnoxious nature is carried out of the hive, or else imbedded under a wax and propolis covering. The sanitary, as well as the other duties, are under the control of the workers. Some are generally engaged fanning fresh air into the hive, which is done by vibrating the wings. In warm weather this is a very trying exertion, and at times nearly all the members of the colony require to be engaged in this work. The functions of the workers, as we have seen, are manifold. They have to build combs, caulk the hive, refit the cradles for the reception of new inmates,

* Regarding the origin of the highly nitrogenous "royal jelly," and which is practically the same as the food supplied to the worker and the drone larvæ in their early stage, and by which the queen is stimulated to lay, etc., some difference of opinion still exists. According to carefully executed zootomical investigations undertaken by Leuckhart and V. Siebold, and later still more exhaustively by Paulus Schiemenz, whom Cheshire followed, this substance is elaborated by a glandular system situated in the head and thorax of the insect. If emanating from these glands it must be produced by secretion. Other investigators hold, however, that the substance is digurgitated from the chyle-stomach and the product of semi-digested food. I am unable to conceive how it is possible for the bee to digurgitate the material from the chyle-stomach, owing to structural difficulties, whilst on the other hand, there is no such objection to the secretory origin. The subject will be discussed when I come to deal with the internal anatomy of the bee, and if in the meantime I become convinced of the correctness of the chyle-stomach theory, I shall be quite ready to change my views in accordance. Nevertheless, an alteration of opinion as to the origin of the food will not in the least invalidate the above statements concerning the obviously large quantity required, nor those regarding the suppliers and consumers.

remove objectionable inmates, and sometimes fight them, ventilate the home, keep the brood warm, and feed the other inmates, whether larvæ, queen, or drones. They hardly ever rest, for the feeding goes on at night as well as during the day. Moreover, their foresight or innate industry keeps them constantly engaged in storing provisions for future emergencies. All this labour taxes their energy greatly, and during the busiest time of life, when plenty of honey and pollen is gathered, and consequently much brood reared by them, they wear out rapidly. The life of the workers lasts on an average only forty days during the summer, but in times of inactivity continues up to four months and sometimes longer.

BEE-KEEPING ON THE GOLDFIELDS.

BY A. CRAWFORD.

“When on the goldfields last year, in the course of my lectures, I advocated the keeping of bees, or at least that a trial should be made, as I saw no reason why they should not succeed if they were provided with water, either fresh or brackish. Mr. McCormick, a resident of Coolgardie, came in to see me during the week, and said that he had two hives up at Coolgardie, and that they were doing very well and seemed healthy and gathered a fair quantity of honey. He also states that the honey is very rich, and that it granulates very quickly. This might be expected in such an intensely dry climate. The bees he keeps are blacks, and so far he has not seen any appearance of the moth. I would be very glad to hear from any others on the fields who have made the experiment, and hear how they have succeeded. I do not think that large apiaries would thrive or pay, as the bees would have to go too far afield to get supplies, but I feel convinced that a great number of hives scattered about among private families—say from three to six at one place—would be very productive and supply all the honey required for home purposes, and leave a large margin for friends or sale. I shall be very pleased to give any who intend keeping them all the information in my power, and any assistance possible. I would strongly advise intending bee-keepers to get only pure Italians, as it is only a matter of time until the moth makes its way up. Swarms will get away now and again into the bush, and if black bees are allowed to go their homes will simply be breeding places for the moth.

If only Italians are taken up, even if they do get into the bush they will fight the moth and keep it down. Another advantage of having only Italians would be that all the young queens could be depended on to be fertilised by pure Italian drones, and there not being any blacks about, either wild or domesticated, there would be no possibility of hybridisation.”

OUR NOR'-WEST FISHERIES.

The following extracts are made from a report recently furnished to the Minister for Lands by the Chief Inspector of Fisheries :—

“ With the object of thoroughly inquiring into and getting a grasp of the many questions that have lately been brought under the notice of the Department in connection with the pearling industry, I left Perth on the 28th of October last, and arrived in Broome, the depot of the pearling fleet, early in November.

THE PEARLING INDUSTRY.

“ Omitting any mention of the early history of the industry, I purpose to give a brief outline of its existence at the present time. During this year, from the 20th of June, 1900, 177 boats have been licensed under the Pearlshell Fisheries Act, 1886, representing a total tonnage of 2,480. The average size of the 159 luggers employed is 10 tons, the other boats being schooners of different size from over 100 tons down to 30, principally employed as store ships for provisions and shells. Each lugger carries a crew of six men, the diver being in charge. The schooners generally carry, beside their own crew, extra men in case of any sickness on board the luggers. The total number of male adults engaged in the pearling industry may be approximately put down at 1,000.

“ That a large amount of capital has been invested in the industry is proved by the fact that the approximate value of the fleet now afloat, including schooners, is, roughly, £75,000.

“ The following returns for the last 10 years will shed considerable light upon the state of the industry :—

Year.	Weight of pearl-shell gathered.		Value. £.
	Tons.	cwt.	
1889	...	744 10	74,450
1890	...	702 10	70,250
1891	...	749 0	89,880
1892	...	781 9	78,471
1893	...	540 17	57,997
1894	...	422 15	35,499
1895	...	352 14	26,258
1896	...	362 8	30,160
1897	...	366 0	38,630
1898	...	538 6	76,586
1899	...	609 15	87,346
Total	6,170 4	665,527

“ It is extremely difficult to estimate the value of pearls collected from this quantity of shell, owing to illicit pearl-buying among the Asiatics, but the estimated value, taking the figures of the statistical register for the past 10 years, is £300,000, making a total value of pearls and shell of £955,527.

THE TURLING INDUSTRY.

"From Broome I visited Beagle Bay and the Lacepede Islands, with the object of inquiring into the turling industry that has lately been started in these waters. The company's factory, which is yet in a primitive stage, has been erected at Beagle Bay on a site on the mainland, where plenty of wood and water is obtainable. A few months ago the lease of the islands of the Lacepede group, named Middle and West, was granted for a term of years, with the right of collecting turtle. The work of catching these reptiles of the Chilonia family on the islands, and boating them over to the factory where the soup is made, is now in full swing. The venture is yet in its experimental stage, but there should be no doubt that in time an article will be placed on the market second to none at present before the public. In my opinion, with proper management there is every prospect of bringing the venture to a successful termination. The islands of the Lacepede are the home of the female turtle (the male never going on shore) during the laying season, which lasts for three or four months every year. Thousands of these animals deposit their eggs on the sandy shore, and although there are vast numbers inhabiting the northern seas, care will have to be exercised by those engaged in the industry that they do not kill all the turtle that lay the 'golden eggs.' Each full-grown female turtle lays approximately one thousand eggs. Dame Nature, evidently realising that there natural enemies, in the way of hawks by land and sharks by sea, were numerous, provided for this by making the animal prolific in ova. A very small percentage of the turtle hatched by the hot sand ever come to maturity, and any practical scheme whereby nurseries could be established until the young were able to protect themselves is worthy of consideration by those engaged in the industry.

"From an economical standpoint our northern waters, from Sharks Bay upwards, are extremely valuable, abounding as they do with many classes of fish food, and offer splendid inducement for the investment of capital. That the pearling industry is a valuable asset to the colony, and a lucrative industry to those engaged in it, is, I think, beyond question."

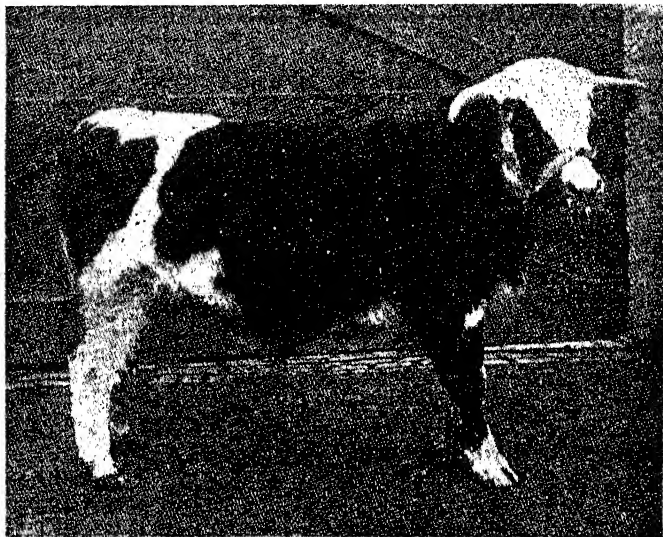
There is no doubt concerning the beneficial influence of lime—either mild or caustic or unslacked—to many classes of soils under certain conditions. For instance, peaty soils, newly reclaimed, are sweetened; heavy clay soils are lightened and made friable; even sandy soils may be improved.

Pullets intended for breeding from should not be forced to lay too early; let them build up a good frame and constitution. If they begin laying feed them well, and let them have plenty of cut green bone, as that will provide much egg-forming food and lessen the drain on the immature system.

DEXTER HIGHLAND CROSS.

BY A. CRAWFORD.

The steer shown in the illustration is a cross between the Dexter and Highland breed of cattle. It was bred by His Majesty the King, and obtained first prize at the Smithfield Show, London, December, 1900. The steer, at time of showing, was 945 days old and weighed 1,222 pounds, having averaged a daily increase of 1.29 pounds from the day it was calved. His Majesty also won first prize with a pure bred Dexter steer, 2 years old, that had an average daily increase of 1.98 pounds per day from date of birth. His Majesty also won first prize for Dexter shorthorn steer, 3 years old, weighing 1,622 pounds. In this State, the Dexter is by



DEXTER BULL.

most beef breeders looked down on as not being worthy of notice on account of his small size, but each year in England it is coming more and more into use for crossing purposes for beef. Well bred Shorthorn heifers are put to Dexter bulls in preference to Shorthorns, and with most excellent results. As regards quality it ranks with the best. Last year and the year before in the exhibition of dead meat, the gold medal, given by Her Majesty the late Queen for the best beef irrespective of weight, was won in one case by a pure Dexter, and in the other by Dexter-Shorthorn cross.

Year after year the demand for Dexter bulls for crossing is increasing, and their extra good qualities are being recognised outside of England, as instanced by a short time ago, a shipment of 20 being sent to Argentina, having been purchased by two large cattle breeders there.

Some of the young stock got by the stud Dexter bulls belonging to this Department, in this State, have produced from the common cows here perfect models of what a beef animal ought to be. As for the milking qualities, there is no other breed that has yet been found that has yielded the same weight of milk for the weight of the animal as the Dexter. Mr. Sutton's cow, Rose, live weight 613 pounds, produced in 12 months 6 tons 9 cwt. of milk, or about $23\frac{1}{2}$ times her own weight of milk in a year, and a heifer of hers, at 3 years old, gave 15 times her own weight of milk in the 12 months.

SISAL HEMP AND ITS CULTIVATION.

Sisal Hemp is the name given to the fibre procured from the leaves of *Agave rigida*, var. *Sisalana*, a native of Mexico, whence the fibre, derived from cultivated as well as from wild plants, is exported. Other species of *Agave* and of *Foureroya*, indigenous in Mexico and Yucatan, are utilised for the same purpose, and the fibres, of various qualities, prepared for exportation. In the Bahamas the Sisal is cultivated under British auspices, while in India also its cultivation has of late years been undertaken.

Agave rigida, like *A. Americana*, the so-called American aloe, cultivated in gardens for the scenic effect of its gigantic leaves and towering flower-stalk, is not a true aloe, like those South African plants producing the medicinal bitter aloes, nor is its fibre a true hemp like that furnished by the Asiatic hemp plant, although the resemblance in either case is sufficiently close to have given rise to the respective names. The Agaves and Foureroys belong to the natural order *Amaryllidæ*, in which also are included the giant lilies of the Eastern States of Australia; and all of the plants named furnish fibre of superior quality.

From the record of experiments recently made in their cultivation in India, we learn that the leaves of the Sisal plants range from about 3 ft. to 8 ft. in length with a breadth of 3 in. to 6 in., and their spread is usually somewhat greater than their height. They grow most luxuriantly in rich soil, but it is possible that in these circumstances the fibre may not be of the best quality. Loam or good sandy loam appears to be the best, and an admixture of lime in it seems to suit them; but they do not thrive as well on saline soils or those that are wet and heavy, unless when planted on mounds or embankments. The best distance

between the plants is thought to be 5 ft., but the space requisite for working amongst them would have to be taken into consideration, as well as the quality of the soil and size of the plants.

It is not till the plants have grown for 4 or 5 years that the leaves are cut, and earlier or later during that period suckers are thrown out from below the leaves, to the number of 4 to 12. In the 6th year the flower-stalk is sent up, growing if left alone to a height of 25 ft., and its appearance may be taken to indicate that the leaves have attained their full natural development. The growth of the stalk, however, is prevented by cutting it out at an early stage, so that the whole vegetative energy of the plant may be directed to the leaves. The produce of leaves cut subsequently to the first is on that account of greater value. The number of leaves varies from 25 to 80, their length from 2 ft. to $6\frac{1}{2}$ ft., and their weight from 5 ozs. to $3\frac{1}{2}$ lbs., 2 lbs. being usual. The length of fibre obtained from different cultivations ranged from 36 in. to 78 in., while the proportion of prepared fibre to leaf was 3 to $3\frac{1}{2}$ per cent. by weight.

The fibre is prepared by various processes of a simple nature, including scraping, beating with wooden mallets, tearing into shreds, washing and macerating in water, and drying in the sun, these operations being variously combined, and with the aid of machinery, in the separation and cleaning of the fibre. Samples recently produced experimentally in India were valued by experts in London at £30 a ton.

Sisal Hemp, while of great strength, is especially valued on account of its cheapness, its low specific gravity or lightness, and its capacity for resisting the action of damp, so that it is particularly suited for the manufacture of ships' cables and rigging, and the cables made of it remain more flexible in cold climates than those spun from Manilla hemp. Though the fibre is very strong, it is at the same time of fine quality, and is used for the manufacture of other textures such as bags, and, taking up dyes more readily than others of its class, it may be worked up in the production of a variety of fancy articles.

Shade is absolutely necessary for poultry in hot weather. Heat affects them and many die from its effects. Do not delay in providing shelter of some sort. Give plenty of fresh, clean water, and keep it well shaded from the sun and as cool as possible. Where water is scarce there is no necessity to waste it. Six inch or 8in. flower pots with a cork in the bottom are excellent; the water is kept cool, and the evaporation is less than from a flat dish or pan.

PARASITES OF INSECT PESTS.

THEIR INTRODUCTION ADVOCATED.

LETTER FROM MR. CHARLES HARPER, M.L.A.

The Minister of Lands has received the following interesting communication, advocating the introduction of parasites of insect pests, from Mr. Charles Harper, M.L.A.:—

Sir,—I do not suppose that the vignerons of the colony are just now overflowing with gratitude to the Government after having been encouraged to believe that they might expect some State assistance in organising their industry, and then to be told that the law of the Commonwealth forbids the State to give such assistance. Since many avenues by which the various branches of agriculture might have been aided are now closed by this law, it is all the more important that those known avenues which are left should be opened out and be made as efficient as possible, and new ones sought with unceasing vigilance. It is with this object of drawing your attention to some of these that I now address you.

If we were to ask those interested in the various branches of agriculture what could be done by the State to help forward their future prospects, the farmers and graziers would probably say, "Continue to keep out the malignant diseases of live stock, protect us against the ravages of the rabbit, the locust, and the dog. Do this and much anxiety will be removed, and our staple products will be multiplied." The horticulturalist would probably say, "Keep out the scourges of other lands, be vigorous in exterminating those within our State, and there will be ample room and profitable employment for tens of thousands more people." You may ask how this can be accomplished. The way can be seen if we observe what is being done elsewhere.

Let us first realise the fact that the greatest destroyers of life are those forms of life which reproduce with the greatest rapidity. How incomparable in numbers are the victims to the claw of the tiger to those who are stricken by cholera; therefore, our greatest hope of destroying the agriculturists' enemies is by encouraging those forms of life which prey upon those enemies. In California a staff is kept for ever on the alert watching for the enemies and the friends of the occupants of the land. Mr. A. Craw, who is at the head of this branch, has lately reported some interesting facts on these matters, which indicate what may be done to help our land occupants. I have made the following extracts from Mr. Alexander Craw's semi-annual report to the State Board of Agriculture, August, 1900:—

THE GRASSHOPPER PARASITE.

"I am pleased to report the successful importation of the dipterous parasite of grasshoppers or locusts. Mr. Compere, your special agent, made a side trip of 500 miles in New South Wales to

secure these parasites. He could only find a few grasshoppers, and those he sent. On his return, and before he reached Sydney, the hoppers were dead, even with the food in the box. He had the packet placed in the steamer refrigerator and forwarded to San Francisco with other beneficial insects. The shipment reached the office on May 7th. I placed the dead hoppers in a breeding jar. A few flies of the genus *gaurax* issued a few days after. On June 11 a few of the true parasites made their appearance in the jar. I telegraphed to Horticultural Commissioner William Berry, of Niles, as to the prospect of finding grasshoppers in the Livermore Valley, and he wired me to be sure and take them there. A. D. Pryal, a Horticultural Commissioner of Alameda County, accompanied me by rail to Livermore. We drove out to the uncultivated districts, where locusts prefer to deposit their eggs. There we were fortunate to find the locusts had hatched and some nearly full-grown. Here the parasites were liberated. I made a small opening in the silk cover of the jar, and as they issued I counted them and found that 59 perfect flies were in the colony. The vineyards of Livermore and other sections of the State are frequently raided and stripped of their leaves and berries by grasshoppers. I consider the Livermore Valley one of the very best localities in the State for the establishment of such insects, as there is a good range where they can spread over into the San Joaquin and Sacramento Valleys. This parasite belongs to a group of parasitic flies, all the members of which prey upon other living insects. Each species confines its attack to its own particular pest. Thus the species will deposit its eggs upon grasshoppers; there are other species that prey upon certain classes of beetles, and others on butterfly and moth caterpillars and chrysalis. It is a well-known fact that without such friendly aids certain insects would cause great destruction of crops. I will make several visits to Livermore, and capture some grasshoppers to ascertain if the parasites have established themselves. J. P. Buggy, of Corowa, New South Wales, is the gentleman that has the credit of first calling attention to this parasite. A. M. Lea, Entomologist of Tasmania, when in New South Wales made a very thorough and careful investigation into the work of these parasites, and stated to Mr. Compere that he found 90 per cent. of the female locusts were parasitised, and 15 per cent. of the males. As you are aware, you have been endeavoring for the past nine years to secure living specimens of this parasite.

CABBAGE BUTTERFLY.

"The European cabbage butterfly, that was introduced into the Eastern States many years ago, and was a troublesome pest in Los Angeles County a few years ago, is not so plentiful now, owing to the attacks of two parasites; one is a *Tychina* fly, and the other is a small hymenopterous parasite. Both work in the butterfly chrysalis. This pest is found in all of the bay counties, so I wrote to Commissioner E. H. Rust, of Los Angeles, requesting him to

send me a supply of the chrysalis, so as to secure the *Tychina* parasite. Mr. Rust detailed one of his Inspectors, Fred. Masken, of Long Beach, to collect and forward the insects, which he kindly did. I was very much surprised to breed from the material he sent hundreds of small hymenopterous parasites that were new to me. I sent specimens to Dr. L. O. Howard, and he kindly identified them as *Pteromalus puparum*, an enemy of the cabbage pest. The parasites have been liberated. We do not look for extermination, but they will reduce the numbers of the pests, so that cabbages are not as completely riddled by caterpillars as formerly.

FRUIT FLY.

"Your special agent, George Compere, writing his observations from Fiji, says:—

'The Fiji Government are now negotiating with the agents of the Oceanic Steamship Company to have the steamers of that line call at Fiji ports to and from California. Should they do so there will be great danger to the fruit interests of California. Mango fruit is very badly infested with the maggots of fruit flies. We breed two species from various fruits, and were informed that 80 per cent. of their oranges become infested with maggots. The new crop is just setting up, so we are unable to say what fly infests their oranges.' Mr. Compere, writing from Queensland regarding the ravages of 'Queensland fruit fly' (*Tephritis tryoni*) says: 'The growing of deciduous fruit in Queensland is a thing of the past. It made me sick at heart to see the destructive work of this pest. Not a peach, plum, prune, or apricot is allowed to escape its attack.'

ANOTHER BLACK SCALE ENEMY.

"Mr. Compere has discovered a most important internal parasite of the black scale in Brisbane. He writes:—'This is the parasite we have been looking for. Arriving at Brisbane I noticed that the oleander trees were free from the black scale. I at once made a search to ascertain, if possible, what was responsible for the absence of that pest, for certainly the climatic conditions are very favorable for that scale. On making an examination of all the trees met with, I soon discovered that it was the work of an internal parasite. The majority of the scales had two and three holes in their backs, and some with four and five holes.'

"The few scales on the trees were not sufficiently developed to be parasitised, so he visited other sections, and returned later. Since then I have received from him two shipments of infested twigs, from which the small parasites have recently been issuing. Through the kindness of the Californian Nursery Co., of Niles, in furnishing me with oleander plants in pots, I have been enabled to keep the Brisbane parasites indoors, to guard against the possible introduction of any secondary parasites that may exist on the imported parasites.

"I stocked the oleander plants with young black scale, also eggs, and they are now very thoroughly infested. Each plant is placed in a large glass jar covered with silk. The oleander branches sent by Mr. Compere I have inserted in glass tubes containing some water, and to prevent the little parasites from accidentally falling into the water I have stopped the mouth of each tube with sphagnum moss, and placed them in large glass breeding jars. Those are also covered with silk, and as the parasites develop they are transferred to other jars. In this way the material will keep fresh until all the parasites mature. If the internal parasites that breed in the half-grown black scale collected by Mr. Compere at Honolulu, and liberated in this State, establish themselves, together with the other species and *Rhizobius ventralis*, we will be in a position, I hope, to keep this pest under control. The Horticultural Board of California has had many very important successes in this line of action. The above only refer to some of the most recent discoveries."

The apple growers of America have lately discovered that Australian apple growers use only

BLIGHT-PROOF STOCKS

in planting their orchards, as a preventive against the "Woolly aphid" on the root. Americans are now inquiring eagerly for this stock, claiming that if they can, through this means, keep the pest off the roots of the apple, they will have but little trouble with it on the limbs, as they have there (the home of the "Woolly aphid") its natural enemy to keep it in subjection above ground. Why should we not have this natural enemy made at home in the Bunbury, Blackwood, and other districts, where this pest causes so much trouble?

The shadow of a dark cloud is coming over us in the

MARCH OF THE RABBIT.

How are we going to stay that march? Why not seek his natural foe in disease. It is well known that a few years ago opossums were a scourge in some parts of the Eastern districts, until a disease attacked and almost exterminated them. Could not this disease be traced and tried (as well as others) upon the rabbit? Perhaps, also, research might find a disease in dogs, which would be more effective against the wild dog than the scalp and tail fee has proved to be.

But let me call your attention especially to the remarks of the Californian agent respecting the work of

THE FRUIT FLY

in Queensland and Fiji:—"The growing of deciduous fruits in Queensland is a thing of the past. It made me sick at heart to see the destructive work of this pest. Not a peach, plum, prune, or apricot is allowed to escape its attack." Writing from Fiji, he

says:—"We breed two species of flies from various fruits, and were informed that 80 per cent. of their oranges become infested with maggots."

Let me remind you that, although we are aware of a method by which this pest can be subdued, if not exterminated, no special steps appear to be contemplated this season in this direction, and, judging by the experience of last year, it would appear that some influences within the departments of "land" and "law" (not even excepting the bench) are only too pleased to throw obstacles in the way of the policy of

HELPING THE PRODUCER.

This may be the effect of ignorance, but is it too much to ask of a Government (which has ever claimed that "helping the producer" is one of the chief planks in its platform) that departmental influence should be given in support of that policy? Probably we should see prompt and vigorous action from the official world were it a question of a virulent disease among poodle and terrier dogs. It has long been known that by far the best fig in the world is that known as the "Smyrna," grown only on the shores of the Mediterranean.

West Australia being a happy home for the fig, this variety should thrive here, but till lately it has absolutely refused to fruit away from home, the new known reason being that the fruit will fall before ripening unless visited by a tiny fly coming from the flower of another fig, known as "Capri." This tiny fly has been transported to California, and has proved his virtue there, and promises to be worth to that State the ransom of many Princes. As "ocean greyhounds" from the Mediterranean call on us every week, why should we not use this opportunity for establishing the "Smyrna" and its necessary attendants here?

This fruit being, when dried, exportable, its production might give a value to much vacant banksia land. I feel confident that it only requires a little more financial aid to fire the energies and enthusiasm of the Acclimatisation Committee, who, perhaps, might work in conjunction with the Department of Agriculture in a systematic endeavour to give our toilers the benefit to be derived from the experience gained elsewhere, in calling in and maintaining an ever ready supply of our silent but active allies in the lower forms of life.—(Signed) Charles Harper.

COMMENTS BY THE HORTICULTURAL EXPERT.

The Horticultural and Viticultural Expert of the Department of Agriculture, Mr. A. Despeissis, in a report to the Minister, makes the following comments on Mr. Harper's letter:—

Mr. Harper's communication bears on a subject which, in other countries, where fruit-growing ranks as one of the wealthiest industries of the land, is deemed worthy of special attention. In California, notably, every encouragement is given by the State to

the introduction, breeding, and propagating of friendly insects which are known to prey on the parasites of orchard and garden crops. It is singular that it is in Australia, where very little has hitherto been done in that direction, that the Californians have found the most promising field from which to recruit, among the lower world of insects, those helpmates to whom they have set the task of ridding their cultivated crops of some of their most troublesome pests. Thus Koebele, a special agent despatched from America, discovered in Australia the *Verdalis cardinalis*, a small ladybird, which, introduced into California, promptly attacked the Cottony cushion scale, which at one time seriously threatened the citrus-growing industry of that State. So successful was this diminutive beetle in its work of destruction of the scale, that it, in its turn, was threatened with extinction through want of food, and now, at some of the State insectaries, the scale has to be bred to feed colonies of the ladybird. The *Rhizobius ventralis*, another ladybird, preying on black scale, has also, in America, done excellent work. No doubt Mr. George Compere's latest discoveries, especially the internal parasite of

THE BLACK SCALE,

in Queensland, will, now that it is introduced into California, rid that country of that troublesome pest, and tend to keep it in subjection to the same extent as it does in Queensland, where the black scale, although the climate is particularly suitable to its spread, is not considered a particularly troublesome pest. An effort should be made to introduce this internal parasite into Western Australia, where the black scale is widely distributed, and is a serious pest.

THE GRASSHOPPER'S PARASITE,

another Australian friendly insect, has, since its discovery by Mr. J. P. Buggy, of Corowa, and the late Mr. Sydney Olliff, Government Entomologist of New South Wales, been pronounced by entomologists to have been the cause of the fact that Australia is not swept by destructive swarms of locusts with the same severity as is Algeria, Tunis, and Africa generally, as well as some parts of America. The cabbage butterfly parasites, viz., the "Thychina" fly, and the *Pteromalus puparum*, a small hymenopterous parasite, it would be possible to introduce from California, when in the dormant state, by packing in the cool chamber on board ship.

THE WOOLLY APHIS,

as all Australian fruit-growers know, has ceased to be a very formidable enemy to the apple-grower, since the practice of working apple trees on blight-proof stock, which originated in New Zealand, has been widely adopted all over Australia.

THE FRUIT FLY,

of all destructive insects mentioned by Mr. Harper, is, to my mind, the pest which is likely to be more particularly destructive in Australian orchards. An introduced pest itself, it has, through the channels of trade and interchange, been unknowingly transplanted from the locality where it first developed, without its natural parasites being taken along with it. Entomologists are yet in the dark on this point. With more precise knowledge concerning all that relates to the fruit flies, their presence, it is natural to infer, will be less dreaded by fruit-growers.

THE RABBIT PEST

is seriously menacing the pastoral industry of this part of Australia, which, hitherto, has not had to contend with this plague. Flying camps of rabbiters have been detailed to check their progress westward, but I am not aware that Mr. Harper's suggestion that their advance be combatted by means of some virulent disease, such as has decimated opossums, has yet been suggested. Scientists, who have paid attention to the question of natural checks to stop invasions of rodents, such as rabbits, mice, etc., value more the help of a class of allies which Pasteur has, more than any other investigator, helped to draw attention to, than they do to poison or the gun.

Over ten years ago Pasteur offered to the Government of New South Wales to attack the rabbit pest by means of "chicken cholera," a plague which, although fatal to animals of lower orders, has been proved to be innocuous to larger animals and to man. So much contentiousness and irresolution were shown by the special commission appointed by the Government, to report on this suggestion, that Pasteur recalled his agent, and nothing further was done in the matter. Shortly afterwards, however, a plague of mice invaded Armenta, and again afterwards another plague overran the New Forest in England. But these plagues were promptly subdued by means of chicken cholera. I mention these facts, which may not be unknown to the Minister, in the event of some consideration being given to this mode of stopping the dreaded invasion. The diseased rabbits would themselves be the carriers of the plague; they would pollute their burrows, and I venture the opinion that the method, simple and entailing little cost, is one which could be tried with good results in a desert where there is now no settlement, and no fowl fanciers' sentiments to consider in the attempt of saving the country from the rabbit invasion.

THE CODLIN MOTH,

sparrows, starlings, hares, Queensland fruit fly, wax, mussel, and other destructive scales, the phylloxera, have, so far, been successfully kept out of this country owing to timely measures having been taken against their introduction, and the settlers are looking to the State to continue the policy of exclusion, which, after having been enforced for many years, has been proved effective.

THE SMYRNA FIG,

although growing in this country, is still barren. Several growers planted it in the hope that, although the *Blastophaga* wasp, which, issuing from the Capri figs and forcing an entrance into the Smyrna variety, thus fertilising it, is not known to be in West Australia, yet there might be some allied insects with similar habits which might prove to be carriers of pollen from one sort of fig to the Smyrna—a variety which contains nothing but pistillate or female blossoms. Such hope, after many years of experimentations, has, however, failed to be realised. Before attempting the introduction of the pollen-carrying wasp it would be necessary to establish a fig plantation consisting of the Smyrna variety as well, also, as the Capri figs. Three varieties of these are known, of which at least two are essential to the preservation of the succession of generations through the year of the insect. These varieties have been procured and established (from the Mediterranean countries) in California, and in order to obtain trees true to name, this Department would do wisely in communicating with the State Board of Agriculture, California, and procure a consignment of the required varieties from the fig orchards, where the breeding of the *Blastophaga* wasp is now being carried on on a horticultural and commercial scale.

THE HUMBLE BEE

is another friend of the farmer which might be added to the list given by Mr. Harper. It was some years ago introduced into New Zealand, where the cultivation of red clover is, as a consequence, now practised on a large scale. From that colony it would be easy to procure specimens of the insect, which, I have no doubt, could be established here as they have been in New South Wales. Patches of red clover, sown in rotation, would help to keep the humble bees together until the colony was firmly established.

A vast amount of good work has been done elsewhere in the direction pointed out by Mr. Harper, and could with profit be initiated in West Australia. It would be of value to have here, for a time, a specialist such as Mr. Compere, and if still in Australia, it would be advisable to request the State Board of Horticulture of California to direct their agent's attention to the fund of information which he could derive from a visit of investigation to West Australia, where insect life is represented in varieties and numbers beyond computation. It would, moreover, be essential that work of organising and carrying out the introduction and acclimatisation of the farmers' friends already mentioned, as well as of others, be placed in the hands of a competent entomologist.

Since the Department lost the services of Messrs. Claude Fuller and A. M. Lee, who have respectively accepted appointments at Natal and Tasmania, the settlers have been deprived of the assistance an entomologist can give them in matters relating to

this special branch of the study. Nor is it possible, from investigations made by the Department, to obtain the services of a man competent on questions of economic entomology at the present time in Australia. Very few of these specialists are to be found, and they all hold appointments under the various State Departments of Agriculture.

Such a man as Mr. Compere or Mr. Koebele is trained to the work, and in other respects capable officers might, I dare say, be found at the entomological stations controlled by the State Boards of Horticulture in America, and it would be well to have inquiries made.

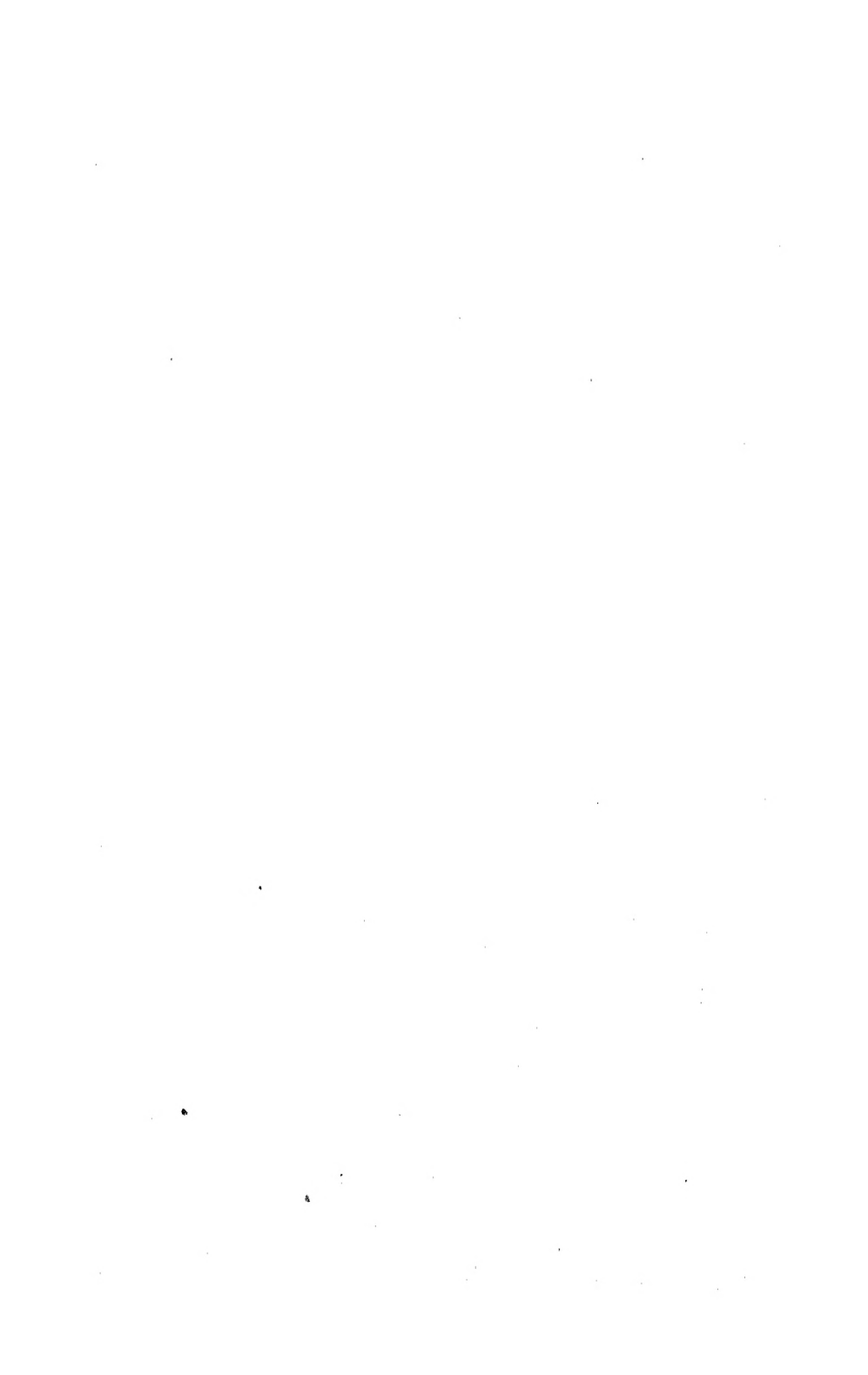
Any blunder or mistake made in the introduction of exotic insects, or the parasites of useful ones, might lead to such serious consequences that no one but a competent and responsible entomologist should be entrusted with the work.—(Signed) A. Despeissis.

THE FEEDING OF PIGS.

In the course of a paper read before the Cirencester Chamber of Agriculture by Professor Blundell, Professor of Agriculture at the Royal Agricultural College, on "The Feeding of Farm Stock," he thus referred to the feeding of pigs:—"I am of opinion that it is the pig, if properly managed, that will do the most towards paying the rent. The number of pigs a farmer can keep will only be limited by the premises he has in which he can fatten them. The average life of a bacon pig of the size now required is 30 weeks, while that of a teg will be 60 weeks, and a bullock will be 130 weeks, consequently the capital invested in the pig department can be turned over more frequently than with other stock. It cannot be too much impressed upon us that pigs, especially at the growing stage, are very susceptible to the extremes of heat and cold, far more so than is the case with sheep or cattle. The best food at our disposal for making prime quality bacon is undoubtedly barley meal, especially when it can be mixed with skim milk or whey. When wheat is cheap enough it may be mixed with the barley in the proportion of one of wheat to three of barley. Bean meal is admirable for mixing, but is usually too high in price for purpose of making meat for the butcher. Weight for weight, there is no food for pigs productive of so much live weight as maize, but that, unless reduced to a small proportion mixed with barley, has the great drawback of making the bacon soft and too fatty, and then you come down to the quality of the low-priced American bacon so largely imported, and which has been almost exclusively fed on maize. Wheat and rice meal have not the same objection, but these also should always be mixed with barley. In early life, when pigs are running out at grass, nothing is cheaper or more adapted for them in the growing stage than



RUNNER BEANS, GROWN AT THE EXPERIMENTAL PLOTS, DRAKESBROOK.
(See Notes, page 81.



whole sound maize or peas. I have found one pound per day, at a cost of one halfpenny, sufficient, provided they have had a good grass run and a few mangels or tares. They should be put up to fatten when they are about nineteen to twenty weeks old, and will weigh 100 lb. live weight. They should be kept clean, and not too many in one sty, six or eight at most, fed regularly three times a day, and never have more given to them than they will clear up. If well-bred and fed with suitable food, they will increase from 10 to 11 lb. per week, and at 30 weeks old should weigh 2 cwt. live weight, and will return from 75 to 78 per cent. carcase to live weight, which is much better than the bullock, which gives 57 to 60 per cent., or the sheep, which gives only 50 to 52 per cent. For that increase the pig will require about 5 lb. to 5½ lb. of dry food per day. No other animal on the farm will give such a good and quick return for the outlay. The ordinary barley meal, bought for pig feeding, is principally made of foreign barley, of which we now import annually 1½ million tons, valued at about seven millions sterling. The price now is 23s. to 24s. per quarter of 48 lb. per bushel. This at 24s. per quarter is £7 per ton, and at 20s. per quarter is £5 17s. per ton. If you cannot make more than 28s. per quarter of your English grown barley in the market, for malting purposes, it is unwise to sell it at such a price, for the pig will willingly give you that for it, and leave you a margin of profit, to say nothing about the valuable manure. 28s. a quarter for your barley, weighed up 56 lb. a bushel, is £7 per ton. Add 10s. for grinding, £7 10s. per ton, or 7s. 6d. per cwt. One cwt. of this meal will increase the weight of the pig 24 lb. When the bacon factories give 9s. 3d. per score (which is a fraction over 5½d. per lb.), the pigs are worth quite 4½d. per lb. live weight. Putting the 24 lb. gain at 4½d. per lb., it will amount to 9s., leaving you 1s. 6d. profit on the meal (which I estimated at 7s. 6d. per cwt.) made from the barley at 28s. per quarter. There are a great many of us who think it would be better for the country generally if we were to produce more bacon and less beer, especially when we bear in mind that we spend sixteen millions sterling for imported pig meat."

[Western Australia spent £78,935 in 1898, and £2,438,488 in 1899, in importing bacon and hams. Twenty-six weeks is long enough for any moderately well bred pig to live in this country, and the butchers like them about a hundred and a half.—Ed. JOURNAL.]

The capacity of any soil to produce any particular crop is governed by the scarcity of any one ingredient necessary for the maturation of the plants. There may be a great superabundance of phosphates and of nitrates, but if potash is deficient the crop will be poor. So if potash is plentiful and phosphate deficient the same result will follow. Each ingredient required by a plant must be available, else no good crop can possibly be produced.

SHOEING HORSES.

An excellent article on "The Horse's Foot and how to Shoe it," by Principal Dewar, of Edinburgh Veterinary College, is printed in the transactions of the Highland and Agricultural Society. Speaking as to, the fitting of the shoe, he says:—"Shoes may be fitted either hot or cold, and cold fitting has still its advocates. But the latter style is now seldom used except on military horses when on active service. There is much more difficulty in obtaining an accurate fit with a cold shoe than with a hot one. Machine-made shoes are more easily fitted cold than hand made ones, as they are more uniform in shape and have a more accurately level horizontal bearing surface. In cold fitting it is necessary to rub the bearing surface of the shoe with chalk for a dark hoof, and some dark material for a white one, in order to obtain complete and close coaptation between the shoe and the hoof, showing where it requires to be further rasped down to obtain a close fitting surface; and after all an accurate fit is difficult to manage. The evils of hot fitting have been greatly exaggerated. Horn is a bad conductor of heat, and no harm need result if the hot shoe is intelligently applied to obtain a close, accurate-bearing surface. Before the shoe is applied at all it should be seen that it is perfectly level on its bearing surface all around to where the seating begins, about one-sixteenth of an inch inside the nailholes; that towards the heels where the seating does not extend should be perfectly level and horizontal; and that when the shoe is held in front of the eye with the branches in line they should be perfectly straight and uniform. The shoe may then be heated all around to a dull red heat and firmly applied to the hoof for ten or fifteen seconds. In thin and diseased hoofs it is quite easy to do harm by applying the hot shoe to long at a time, and a painful condition known as "burnt sole" is produced. But this is only due to gross carelessness, and in good natural hoofs there is no risk with ordinary care unless the sole has been pared to thin around the toe, too much horn removed to receive the clip, or the shoe applied to long. Repeated applications of the hot shoe do no harm if an interval is spent in levelling the hoof between them. The charring of the horn renders it more impervious to moisture, and a much closer and more accurate fit is obtained. In a natural well-formed foot the shoe should be made to fit the hoof. The outer borders of the shoe should be exactly under the outer edge of the wall at the sides of the hoof. Towards the toe, a very little of the wall may be allowed to project beyond the shoe, to be rasped off after the shoe is affixed. This only serves to a slight extent to compensate for the horn that would be worn or broken off during the first hour that the horse was running naturally unshod. From the quarters back to the heels the shoe should become gradually fuller than the hoof, till at the heels it should project from one-eighth to one-fourth of an inch beyond the lower border of the wall, depending on size and form of foot. As

a rule the outside branch should be slightly fuller than the inside ; and the inside branch of a hind shoe should practically follow the line of the wall. The shoe fitted, the branches should be cut to the requisite length. They should extend nearly half an inch further back than the heel of the hoof, depending greatly upon the style and pattern of the shoe used, and should be cut of with a short slope or bevel from the ground surface upwards, but should be well rounded off at the upper bordet.

Immediately the shoe is fitted it should be cooled and again applied to the hoof, and carefully examined to see that it fits properly and accurately. When firmly applied to the hoof with the clip in its proper place, it should be solid, have little tendency to shift, and no tendency to rock, whatever part the shoe may be pressed on. The nailholes should be exactly opposite the white line, and it ought to be seen that they have the proper direction. Machine-made nails are almost invariably used now, and few really bad nails are on the market. They should be made of the very best iron, be solid, bright, soft, and ductile, yet stiff enough to stand being driven without bending under the hammer. There should not be a distinct neck between the head and the shank, as this is a point at which the nail is most likely to break. They are generally about double the width of their thickness, and the heads should be sufficiently large to project slightly beyond the level of the shoe. They are made in sizes to suit all feet, and should never be used larger than is absolutely necessary, as the smaller the nail the less injury it does to the hoof, and the fewer nailholes required the better. Hand-made nails, made of the best iron, are still unequalled for fastening the shoes of heavy horses wearing calkins and toe-pieces and doing extra heavy work. The nails should be driven straight through the wall at an angle, and not too high. In order that this may be done, the point of the nail is bevelled outwards to bring the nail out on the surface of the wall. The surface or belly of the nail should be bent a little away from the hoof, so that the nail in being driven may take an almost straight course and not a curved one. The height at which the nail should come out of the surface of the wall depends mainly on the weight of the shoe and size of the hoof. But a nail driven in the white line, traversing the whole thickness of the wall and coming out at a moderate height, is much more satisfactory than one driven outside the white line, although coming out very high in the wall. The latter splits the fibre of the hoof more, gains no stronger a grip, and the track of the nail is longer in wearing out. It is sometimes beneficial to use different sized nails in the same hoof. The nail being driven with fairly light strokes until the point makes its appearance, is then more rapidly driven, and the point at once twisted off with the claws of the hammer. As soon as the nails are all in position, they should be gone over in succession with the hammer and firmly driven home. The jaws of the the pincers are then held under the broken points of the nails while the heads are

again hammered, in order to turn the points more accurately round. As the points are generally left too long, the position of the foot is now reversed, and they should be reduced to the required length by the file surface of the rasp. The edge of the rasp should then be drawn across the point of each nail to remove the ragged sharpe angle of horn and give a firmer bearing to the clench. The pincers are now held under the head of each nail in turn while the clench is turned down with a few light taps of the hammer. The operation is finished by hammering the edges of the clip as flush with the surface of the wall as possible, but not in a manner to grip the wall, rasping off any projecting horn round the anterior border of the wall, smoothing down the clenches, care being taken not to file them off, and running the edge of the rasp round the lower border of the wall between the wall and the shoe, to take off the sharp edge of the horn and prevent splitting of the fibres. No rasping should ever be allowed on a healthy hoof above the clenches. When the clenches are about a uniform height and distance apart—the posterior perhaps a little lower than the anterior—it adds greatly to the appearance of and finish of the work. The last shoe finished, the hoofs should be dressed with some greasy application to make them more impervious to moisture, and prevent evaporation.

SEA OF AZOV BARLEY.

Mr. Conway, manager of Messrs. Dalgety and Co's farm at Wagin, has forwarded a sample of Sea of Azov barley grown from seed supplied him last season by the Department. The sample is a very fine one, and much better than what was imported from England. The colour is very good, and yielded at the rate of 25 bushels to the acre. This barley is said to be remarkably early for feeding purposes, and will stand cutting a number of times; it is also said to be a good malting barley, several brewers in Queensland having spoken highly of it. The sample of seed procured by the Department was the most abominably disgracefully dirty sample ever landed in this State. The seed was supposed to be specially cleaned, and the price paid by the Department was really exorbitant. The seed was so dirty that nearly all the farmers to whom it was sent declined to foul their land with it. Mr. Conway is an ardent experimentalist and a thorough farmer, and he especially cleaned the seed with the result indicated above. It is gratifying to know that some good has resulted from the Department's efforts.

NOTICE TO SUBSCRIBERS.

The annual subscription to the JOURNAL for the current year was due and should have been paid on January 1st. Those who have not already sent in their subscriptions are requested to do so at once, if they wish to have subsequent issues sent to them.

ANNUAL PRODUCERS' CONFERENCE.

Herewith is published a list of those resolutions, received up to the time of going to press, from the various Societies, for discussion at the forthcoming Conference, which opens on Tuesday, March 5th, together with a list of delegates.

RABBITS, INVASION OF.

Greenough Farmers' Association.

"That in the opinion of this Conference, in view of the invasion of the rabbit pest, the Government should spare no expense in preventing them from over-running the State."

Quindalup Progress Association.

"That in the opinion of this Conference it is desirable that the Government take immediate steps to prevent the further incursions of rabbits into this State."

Capel Farmers' Association.

"That in the opinion of this Conference the Government should put up a rabbit-proof fence to stop the rabbit invasion."

Cookernup Farmers' Progress Association.

"That in the opinion of this Conference, in order to check the progress of rabbits into this State, the Government be strongly urged to erect a rabbit-proof fence at once."

Williams Agricultural Society.

"That this Conference resolves itself into a deputation to wait on the Hon. the Minister for Lands with the object of urging the speedy erection of the suggested rabbit-proof fence."

DOGS, TAX ON.

Capel Farmers' Association.

"That in the opinion of this Conference the Government should put a tax of £1 per head on all dogs in the South-West Division, except sheep and cattle dogs."

DOGS, REWARD FOR NATIVE.

Nelson Agricultural Society.

"That in the opinion of this Conference the bonus for the destruction of native dogs should be increased to £1, the additional 10s. to be a tax on sheep and cattle owners."

Brunswick Farmers' Association.

"That in the opinion of this Conference the reward for the destruction of wild dogs be increased to £1."

Narrogin-Williams Agricultural Society.

"That in the opinion of this Conference the production of native dogs' tails should be sufficient warranty of their destruction, and that the reward should be payable on production of the tails."

"That in the opinion of this Conference the reward for the destruction of native dogs in settled districts should be increased to twenty shillings."

EAGLE HAWKS, REWARD FOR.

Brunswick Farmers' Association.

"That in the opinion of this Conference a reward of two-shillings and sixpence be offered for the destruction of eagle hawks."

Nelson Agricultural Society.

"That in the opinion of this Conference the Government should give a bonus for the destruction of eagle hawks."

Williams Agricultural Society.

"That in the opinion of this Conference the Government should offer a reward for the destruction of eagle hawks."

WILD DUCKS, CLOSE SEASON FOR.

Capel Farmers' Association.

"That in the opinion of this Conference the Government should declare a two years' close season for ducks."

DESTRUCTION OF BIRDS AND GROUND VERMIN.

Jandakot Agricultural Society.

"That in the opinion of this Conference, Roads Boards should have the power, at the request of a majority of the ratepayers of their districts, to levy a rate for the purpose of offering a reward for the destruction of destructive birds and ground vermin."

ROADS BOARD ACT.

Albany and District Settlers' Association.

"That in the opinion of this Conference it is to be regretted that the amendment of the Roads Board Act, requested by the Conferences of several years and promised by the Government, has again been shelved, and this Conference again urges upon the Government the necessity of introducing the necessary Bill into Parliament at the earliest possible moment."

ROADS BOARD ACT, AMENDMENT OF THE.

Waigerup Agricultural Hall Association.

"That in the opinion of this Conference it is desirable that the Government introduce a bill to amend the Roads Board Act, the present Act; passed in 1880, being found very unsatisfactory."

ROADS BOARDS.

West Coolup Farmers' Association.

"That in the opinion of this Conference any person paying Roads Board rates, however small, shall be entitled to a vote, and further that, so long as the rates are paid, the Roads Board shall not have the power to strike such person's name off the Roads Board Ratepayers' Roll."

ROADS BOARD CONFERENCES, PASSES FOR.

Jenapullen Agricultural Society.

"That in the opinion of this Conference delegates to Roads Board Conferences should be allowed free passes by rail to any districts where such Conferences may be held."

DELEGATES TO CONFERENCE.

Harvey Farmers' Club.

"That in the opinion of this Conference it is desirable, in the interests of the producers and with a view to increasing the usefulness of the Conferences, that no middle men shall be deemed eligible for the position of a delegate to the Producers' Conferences."

POULTRY, DUTY ON.

W.A. Poultry and Dog Society.

"That in the opinion of this Conference the Government be approached with a view to fixing a maximum duty of (say) 2s. on all poultry imported into this State."

POULTRY DISEASES.

W.A. Poultry and Dog Society.

"That in the opinion of this Conference it is desirable to take into consideration the best means of preventing and stamping out the various diseases prevalent among poultry."

POULTRY COOPS ON RAILWAYS.

W.A. Poultry and Dog Society.

"That in the opinion of this Conference the Railway Department be requested to provide travelling coops for the carriage of poultry in the same manner as is done in the Eastern States."

RAILWAY RATES.

Chapman Farmers' Association.

"That in the opinion of this Conference the preferential rates allowed by the Railway Department on the carriage of produce, etc., to long distances from Perth are inimical to the best interests of farmers in certain districts."

King River Settlers' Association.

"That in the opinion of this Conference the present rate of freight on perishable produce should only be charged on a distance not exceeding 300 miles, and for every additional 100 miles or part thereof only 1s. per ton should be charged."

Albany and Districts Settlers' Association.

"That in the opinion of this Conference, the resolutions of previous Conferences in reference to railway rates not having been given effect to, the Commissioner of Railways be asked to at once have the rate book revised by the insertion of the words 'and garden produce' on lines 2 and 20, page 47."

WEIGH BRIDGES AT STATIONS.

Chapman Farmers' Association.

"That in the opinion of this Conference all Railway Stations where there is an annual traffic of 300 tons or over should be supplied with a cast weigh bridge, providing there is an officer in charge."

Greenough Farmers' Association.

"That in the opinion of this Conference it is desirable that the Government instruct the Inspector of Weights and Measures to make provision for the testing weighbridges at railway stations once every month."

RAILWAY YARDS, FENCING IN.

Cookernup Farmers' Progress Association.

"That in the opinion of this Conference the Government be asked to fence in all yards at railway stations in populated districts."

CANNING JARRAH RAILWAY, PURCHASE OF.

Darling Range Vine and Fruit Growers' Association.

"That in the opinion of this Conference it is desirable that the Government purchase the Canning Jarrah Company's railway."

RECEIPT FOR GOODS AT RAILWAY STATIONS.

Capel Farmers' Association.

"That in the opinion of this Conference the action of the Railway Department in refusing to give receipts for goods handed in at sidings is to be condemned."

PERISHABLE GOODS ON RAILWAYS, CARRIAGE OF.

Toodyay Agricultural Society.

"That in the opinion of this Conference it is desirable that the Railway Department receive and forward all perishable goods on holidays, and on Saturdays up to 4 p.m."

BURNING OFF.

Chapman Farmers' Association.

"That in the opinion of this Conference the present method of burning the grass on railway lines in agricultural districts is positively dangerous, and should be done before the crops are ripening—that is, before November; and further, the Conference is of opinion that burning on hot days is particularly dangerous."

Moora Farmers' and Progress Association.

"That in the opinion of this Conference the time for burning off timber for agricultural purposes should be advanced one month, viz., from the 1st March to the 1st February, and that local boards be appointed to give or refuse permission to burn off, as they may deem expedient."

BUSH FIRES.

Williams Agricultural Society.

"That in the opinion of this Conference, Roads Boards should be given power to compel the erection of fire guards by settlers in their respective districts."

PIGS, CARE AND REGISTRATION OF.

Greenough Farmers' Association.

"That in the opinion of this Conference it is desirable that legislation be introduced compelling owners of pigs to have a registered ear mark for same; and further, that all owners of pigs be compelled to keep them enclosed from the 15th October in each year to the 1st February in the year following."

TRESPASS ACT, AMENDMENT OF THE.

Greenough Farmers' Association.

"That in the opinion of this Conference, in view of the scarcity of meat in this State, the Trespass Act should be so amended as to prevent the destruction of pigs for trespass."

STOCK FOR SETTLERS, ADVANCING.

Thomson's Brook Progress Association.

"That in the opinion of this Conference it is desirable that the Government should assist settlers by advancing stock to them, according to the amount of security they are able to offer."

STOCK REGULATIONS.

Victoria Plains Farmers' Association.

"That in the opinion of this Conference the Government should amend the regulations relating to travelling stock as follows: 'That at all ports or railways where stock are shipped or trucked, records be kept of all brands and marks on such stock, and further, that similar records be kept at all slaughtering establishments, together with the names of persons supplying such stock, such records to be open for inspection when desired.'"

STUD STALLIONS, IMPORTATION BY GOVERNMENT OF.

Boyanup Farmers' and Progress Association.

"That in the opinion of this Conference the Government should be asked to import stallions, of pedigreed descent on both sides, for the improvement of the horses of the State ; one stallion to stand in each province, at a low fee, for not more than two successive seasons."

STALLIONS, EXAMINATION OF.

Williams Agricultural Society.

"That in the opinion of this Conference all stallions should be required to pass an examination by an officer of the Stock Department as to their suitability for stud purposes. Failing the required standard being reached, penalties to the amount of £5 per annum to be levied, the proceeds of which shall be devoted to the destruction of brumbies."

BOT FLY, HORSES DYING FROM.

Thomson's Brook Progress Association.

"That in the opinion of this Conference a law should be passed compelling the destruction by fire of all horses dying from the effects of the Bot-fly."

SUBSIDIES TO SOCIETIES.

W.A. Poultry and Dog Society.

"That in the opinion of this Conference the Government be asked to agree to a resolution, as carried at a Conference held in July last, to the effect that, the Government should subsidise all shows *pro rata* on the prizes paid the previous year."

Esperance A., H. and F. Society

"That in the opinion of this Conference the Government grants to agricultural and kindred societies should be made on a £ for £ basis, thus putting all societies on their merits as regards financial assistance."

[No delegates.]

Albany Agricultural and Horticultural Society.

"That in the opinion of this Conference the reply of the Minister to the resolution passed at the last Conference in regard to the payment of subsidies to agricultural societies was unsatisfactory, and this Conference again respectfully requests the Minister to give effect to the resolution when allocating the grants this year."

Geraldton Agricultural and Horticultural Society.

"That in the opinion of this Conference the scheme suggested by the Secretary of the Department of Agriculture, in his annual report to 30th June, 1900, with reference to the allocation of Government grants to agricultural societies, should be supported, and further, that the said subsidies should be paid through the Department of Agriculture."

EXPERIMENTAL FARM.

Harvey Farmers' Club.

"That in the opinion of this Conference the Government should at once proceed with the establishment of a suitable and thoroughly equipped experimental farm in this State."

EXPERIMENTAL PLOTS.

Boyanup Farmers' and Progress Association.

"That in the opinion of this Conference the Department of Agriculture should be asked to pay the expenses of an experimental plot of limited size on one selected farm in each electoral district; crops to be grown thereon by the farmers, under the supervision of the Department, for not more than three successive seasons on any one farm."

Newtown Progress Association.

"That in the opinion of this Conference it is desirable that the Department of Agriculture should, before establishing experimental plots in any district, consult the local agricultural society as to the best place to establish same."

HANDBOOK OF HORTICULTURE AND VITICULTURE.

Boyanup Farmers' and Progress Association.

"That in the opinion of this Conference the Department of Agriculture be asked to issue a revised edition of the 'Handbook of Horticulture and Viticulture' without delay."

FRUIT CASES, SECOND-HAND.

Darling Range Vine and Fruitgrowers' Association.

"That in the opinion of this Conference, in order to prevent the further spread of disease among our orchards, it is desirable that growers be compelled to use new cases."

Nelson Agricultural Society.

"That in the opinion of this Conference the Commissioner for Railways should be asked to place prohibitive rates on returned empty fruit-cases."

WOOLLY APHIS IN THE SOUTH-WEST.

Albany A. and H. Society.

"That in the opinion of this Conference the attention of the Department of Agriculture should be called to the existence of the 'Woolly Aphis' in the South-West; and further, that the Department, with a view to its eradication, should be requested to put the Insect Pests Act in force at once."

TREES TRUE TO NAME, LEGISLATION *re.**Donnybrook Progress Association.*

"That in the opinion of this Conference legislation should be passed compelling nurserymen, under penalty, to supply trees and plants true to name, and that all vendors and agents for the sale of trees and plants be registered."

PRUNING FRUIT TREES, LESSONS IN.

Waterloo Farmers' and Fruitgrowers' Association.

"That in the opinion of this Conference a Government Expert should be appointed to travel the South-West portion of this State to give practical illustration on the pruning of fruit trees."

NOXIOUS WEEDS.

Toodyay Agricultural Society.

"That in the opinion of this Conference it is desirable that the provisions of the Noxious Weeds Act, 1900, be made applicable to Spanish Radish and Scotch Thistle throughout the State.

Moora Farmers' and Progress Association.

"That in the opinion of this Conference the eradication of Stinkwort and other noxious weeds should be attended to, and that local boards should be appointed with power to enforce the Act."

CO-OPERATION.

Harvey Farmers' Club.

"That in the opinion of this Conference a union of producers should be established with a view to bringing the producer into closer touch with the consumer and manufacturer."

PERTH MARKETS.

Victoria Plains Farmers' Association.

"That in the opinion of this Conference the Government should take such steps as will ensure the utilisation of the Perth City Markets for the purpose only for which they were erected, *i.e.*, a wholesale public market."

LABOUR, SCARCITY OF.

Wonganine Farmers' Club.

"That in the opinion of this Conference it is highly desirable that the Government should import agricultural labourers into this State, as owing to the lack of suitable labourers the farmers are at a serious loss."

Jenapullen Agricultural Society.

"That in the opinion of this Conference the Government should place a sum of money on the Estimates for the purpose of encouraging the emigration of farm laborers from the rural districts of Great Britain and Ireland to this State."

WIDTH OF TIRES ACT.

Harvey Farmers' Club.

"That in the opinion of this Conference the Width of Tires Act should be amended as soon as possible."

LAND SELECTION ON COMMONAGES.

Greenough Farmers' Association.

"That in the opinion of this Conference all commonages should be thrown open for selection under Conditional Purchase, but not for grazing leases."

CONDITIONAL PURCHASES, IMPROVEMENTS ON.

Greenough Farmers' Association.

"That in the opinion of this Conference all land taken up on Conditional Purchase (Clause 48 of the Land Regulations) be exempt from all improvements, and that on the land being enclosed by a substantial fence and the purchase money paid, the lessee be entitled to a Crown Grant."

SUBURBAN BLOCKS, RE-VALUATION OF.

Newcastle Branch Bureau.

"That in the opinion of this Conference the Government should re-value suburban blocks throughout the State, with a view to reducing the price, many of them being too rocky for cultivation, and fit only for paddocks for stock."

LAND REGULATIONS.

Jandakot Agricultural Society.

"That in the opinion of this Conference the Land Act be so amended as to allow the person making a complaint *re* the non-fulfilment of the regulations the prior right of taking up the land referred to, providing his complaint is proved to cause forfeiture."

LAND REVENUE, USE OF.

Boyanup Farmers' and Progress Association.

"That in the opinion of this Conference the Government should be asked to devote five per cent. of the Land Revenue to the direct assistance of agricultural progress; per centage to be calculated on the average of three years' revenue."

LEGAL FENCE, DEFINITION OF.

Drakesbrook Agricultural Hall Association.

"That in the opinion of this Conference the matter of defining a legal fence should receive the early consideration of the Government, with a view to dealing definitely therewith."

AGRICULTURAL BANK ACT, AMENDMENT OF THE.

Donnybrook Progress Association.

"That in the opinion of this Conference the Agricultural Bank Act should be so amended as to allow farmers to obtain loans on the same lines as obtains under the Credit Foncier System in Victoria."

Coogee Agricultural Society.

"That in the opinion of this Conference it is desirable that the Agricultural Bank Act be so amended as to assist *bona fide* settlers who are cultivating the soil, on the same lines as the Credit Foncier Act of Victoria."

POSTAL ACCOMMODATION.

Chapman Farmers' Association.

"That in the opinion of this Conference the postal accommodation between Mullewa Junction, Walkaway and Moonyoonooka is very unsatisfactory, and should be remedied by the establishment of a post office about midway between the districts mentioned; provision also being made for a mail bag for the Moonyoonooka siding."

ANALYSIS OF SOILS.

Donnybrook Progress Association.

"That in the opinion of this Conference the Department of Agriculture should supply the various districts, through their respective societies, with complete analysis of the different soils prevailing in the districts."

NOXIOUS TRADES AREAS.

Coogee Agricultural Society.

"That in the opinion of this Conference it is desirable that the Government should set aside areas for the use of noxious trades, where required, throughout the State."

CHAFF AND CORN BAGS, PURCHASE OF.

Wandering Districts Agricultural Societies.

"That in the opinion of this Conference wholesale buyers of chaff and corn should pay at least half the value of the bags."

BOILER ACT, AMENDMENT OF.

Irishtown Farmers' Club.

"That in the opinion of this Conference the Steam Boiler Act be so amended as to provide for the examination of portable engines used for agricultural purposes once every five years, instead of every twelve months as at present."

PALMWOOL, BONUS FOR.

Capel Farmers' Association.

"That in the opinion of this Conference the Government should give a bonus for gathering palmwool."

BANK ACCOUNTS.

Harvey Agricultural Alliance.

"That in the opinion of this Conference it is desirable to strongly protest against the exorbitant charge made by banks for keeping accounts."

The following is a list of the various Societies (together with the respective Delegates from each) that will be represented at the Conference.

Albany Agricultural and Horticultural Society.
J. Mowforth. J. Pember.

Albany and Districts Settlers' Association.
Chas. Florentine. H. Garraway.

Boyanup Farmers' and Progress Association.
J. M. Whistler. W. J. Eccleston.

Brunswick Farmers' Association.
S. H. Fry. John Partridge.

Busselton Branch Bureau.
A. R. Bunbury. C. L. Weaver.

Capel Farmers' Association.
A. G. Layman. W. H. Lang.

Chapman Farmers' Association.
W. Lynch. Chas. Mitchell.

Coogee Agricultural Society.
A. Anderson. W. H. Allen.

Cookernup Farmers' Progress Association.
E. Cook. J. McEwin.

Darling Range Vine and Fruit Growers' Association.
Rich. Urch. C. H. Brooks.

Deepsdale Farmers' and Fruit Growers' Association.
Leo Lukin. W. H. Strahan.

Donnybrook Progress Association.
J. B. Miller. A. Sharp.

Drakesbrook Agricultural Hall Association.
John Sutton.

- Geraldton Agricultural and Horticultural Society.*
William Burgess. S. R. L. Elliot.
- Greenough Farmers' Association.*
C. H. White. John M. Wilton.
- Harvey Agricultural Alliance.*
W. J. Sutton. J. E. Knowles.
- Harvey Farmers' Club.*
G. P. Charman. W. E. Ash.
- Irishtown Farmers' Club.*
W. J. Morgan. F. Yates.
- Irwin Districts Agricultural Society.*
Dr. Bartlett. A. B. Rollinson.
- Jandakot Agricultural Society.*
Thos. Briggs. G. J. Morgan.
- Jennapullen Agricultural Society.*
D. T. Morrell. John McPherson.
- King River Settlers' Association.*
C. H. Neumann.
- Kojonup Agricultural Society.*
J. J. Treasure. E. Warburton.
- Moora Farmers' and Progress Association.*
Geo. Bishop. A. McKinley.
- Murray Farmers' and Fruit Growers' Co-operative Association.*
A. E. Thomas. E. Fawcett.
- Narrogin and Williams Agricultural Society.*
Michael Brown. John Clayton.
- Nelson Agricultural Society.*
Henry Doust. R. C. Williams.
- Newcastle Branch Bureau.*
A. C. Pole. W. A. Demasson.
- Newtown Progress Association.*
Jas. Forrest. Chas. Smith.
- Pingelly Agricultural Society.*
J. H. Brown. J. N. Shaddick.
- Preston Progress Association.*
R. Fowler. Wm. Jackson.
- Quindalup Progress Association.*
F. Seymour. D. Keenan.
- Southern Districts Agricultural Society.*
H. J. Yelverton. F. B. Vines.
- Thomson's Brook Progress Association.*
Alfred Flavel. John Miller.

- Toodyay Agricultural Society.*
W. R. Sinclair. C. J. Ellery.
- Toodyay Vine and Fruit Growers' Association.*
E. Kistner. G. Sinclair.
- Upper Chapman Farmers' and Fruit Growers' Association.*
S. H. Jupp. J. Eastough.
- Waigernup Agricultural Hall Association.*
W. J. Eastcott. D. D. Mellis.
- Wagin-Arthur Districts Agricultural, Horticultural and Industrial Society.*
E. T. Conway. J. C. H. Nenke.
- Wandering Districts Agricultural Society.*
George E. Watts. Francis White, Senr.
- Wandering-Hotham Branch Bureau.*
Jos. Mitchell.
- Waterloo Farmers', Vine and Fruit Growers' Association.*
Jas. Jeffrey. Fred. C. Woods.
- West Coolup Farmers' Association.*
W. Paull. W. Trenoweth.
- West Australian Poultry and Dog Society.*
J. P. Bridges. A. W. Leane.
- Wellington Agricultural and Pastoral Society.*
Thos. Hayward. John Duce.
- Williams Agricultural Society.*
G. S. F. Cowcher. J. Page.
- Wongamine Farmers' Club.*
C. C. Dempster, Junr. John Lawler.
- Wonnerup Progress Association.*
Jas. Layman. Chas. Reynolds.
- Victoria Plains Farmers' Association.*
John Halligan. Jeremiah Clune.
- York Agricultural Society.*
Hon. R. G. Burges, M.L.C. Kenneth Edwards.

Green food is necessary for poultry, and is cooling to the blood in the hot weather. If water is available a patch of lucerne, rape, or kale should be provided. When no green food is available, give once a week half a packet of Epsom salts mixed in the water for the soft food for a dozen full-grown fowls or ducks. During hot weather do not use maize, peas, or sunflower seed except in small quantities, and not oftener than once a week; these are all too heating. A little boiled rice is a good food for occasional use now.

ENSILAGE.

BY ALEX. CRAWFORD, Dairy Expert.

In many parts of the State the reason given for not dairying all the year round is that there is no feed in the summer except dry grass, and that cows will not give enough milk on such pasture to pay for the milking. This may be true if the natural grasses are utilised only; but no up-to-date farmer expects to be able to keep his cattle in milk all the year round in a dry climate on natural grasses alone. Therefore the question is: What to find that will not cost more than the value of the milk? Bran, chaff, and oil cake, at present butter rates, cannot be bought low enough to make butter pay. There is, however, one form of food that will not require money to be sent off the farm. It will suit the cattle better in the summer than any artificial food; they will milk better on it, keep in better condition and health; and that food is ensilage. Ensilage takes the place of green food, and cows can be kept milking as well on it as on grasses and clover. It is the cheapest crop to harvest and preserve per ton of any crop that is grown; it can be used in a few weeks' time, or it can be allowed to remain even for months. All the stock on the farm will eat it and thrive on it. With an allowance of grain the horse will work well on it. Even suckling lambs will have an increased flow of milk, and the lambs will eat it and put on fat more readily. It is a good food for the sow in pig or rearing young ones, and nothing better can be fed to the cattle. It is quite possible they may not take to it at once, but once they do they prefer it to all other kinds of food. It is not necessary to have elaborate pits of brick and cement, either above or under ground, nor are expensive appliances for working required. A pit in clay ground will frequently do without slabbing, or in sandy or loamy soil face cuts that cost very little will be sufficient to line the sides, or a stack can be built in the most convenient place and weighted with old posts and rails, sandbags, or earth. The use of ensilage in America, England, and the Australian States is becoming general, and among dairy farmers it is looked on as one of the necessities of the farm that cannot be done without. The experience in America is summarised as follows:—That a larger amount of healthful cattle food can be conserved in a silo in better condition at less expense of labor and land than by any other method known; that ensilage comes nearer being a perfect substitute for the succulent food of the pasture than any other food that can be had; thirty pounds of ensilage per day is enough for an average-sized Jersey cow (larger cows will eat more); a cubic foot of ensilage from the middle of a medium-sized silo will average about 4.5 pounds, thus six tons of ensilage would keep a small cow in food for six months, allowing for a considerable amount of waste. The circular silo, made of good hardwood staves, is the cheapest and best.

SCALE-EATING LADYBIRDS.

By the last mail the Government Entomologist of Tasmania forwarded to the Département of Agriculture a number of scale and aphid-eating ladybirds in two bottles. The bottles contain 300 specimens of the *Halysia mellyi* and 538 of the *Leis conformis*. In a letter which accompanied the gift, Mr. A. M. Lea advised that the ladybirds should be immediately liberated on arrival, either in an orange grove badly infested with scale, or in an apple orchard where the woolly aphid is prevalent. Mr. Lea asked to be supplied with a consignment of the *Chilomenes quadripustulatus*, and requested to be informed concerning the condition of the ladybirds sent by him. Commenting on the consignment just received, Mr. A. Despeissis, the Viticultural and Horticultural Expert to the Department of Agriculture, writes:—"The two species of ladybirds advised by Mr. A. M. Lea, Government Entomologist of Tasmania, and despatched on the 28th January last, were delivered at the office of the department in excellent order, only 130 dying during transit. These useful insects were enclosed in two glass jars, in which was also placed a supply of barley in ear and of wattle leaves, infested with aphides and with black scales, to provide food for the ladybirds. The contents of one of the bottles were liberated at two orchards along the Swan, and the insects in the other bottle have been transferred to two lemon trees somewhat affected with black scale at the Santa Rosa Vineyard, near Guildford. The trees have been covered in with mosquito netting, so as to prevent the insects straying to parts of the orchard where they would starve through want of food, and also to guard them against the attacks of the "silver eye" birds, which at this season of the year visit orchards and vineyards in considerable numbers. With care and attention the Department will, it is hoped, soon be, to some extent, in a position to distribute colonies of both of these ladybirds through the fruit-growing centres. This is the second attempt made to naturalise in Western Australia the *Leis conformis*. Upon being appointed to the then Bureau of Agriculture, in 1896, Mr. Claude Fuller, now Government Entomologist of Natal, brought from New South Wales a colony of these insects which were liberated in a garden in the neighbourhood of Perth, where a plentiful supply of aphides were to be found. These insects have either fallen a prey to their natural enemies or have migrated to another locality, and none have since been noticed. These ladybirds are shining yellow with black spots, and although the entomologists assert they do not occur in Western Australia or New Zealand, they are not at all uncommon in the Eastern States of Australia and Tasmania. The good these insects do is to be seen chiefly in the peach orchards, where they devour the black peach aphid. *Leis conformis* also preys upon pear, plum and orange aphid, the woolly blight, and upon cabbage and other garden aphides, as well, also, as upon the black scale so common in this part of Australia."

The following letter appeared in the *West Australian* on the 8th inst. :—

“Sir,—In view of the well-known fact that ladybirds are destructive to crops, particularly potatoes, in the Eastern States, is it wise to import them? To my mind, the proposed cure for scale will be as bad, if not worse, than the disease itself.—Yours, etc.,—CAUTIOUS.”

On the matter being referred to the Horticultural and Viticultural Expert of the Department, Mr. Despeissis stated that the warning was a sound one. The depredations caused to crops in various parts of the world by the distribution of insects through the channels of trade and interchange had, in some instances, reached very large figures. Too much discrimination could not be exercised in introducing new plants and animals, and especially in introducing insects and animals of the lower orders, which were of such diminutive size that they were hard to discover. In the case of the two ladybirds recently introduced, the correspondent referred to would have had his alarm allayed if he had called at the Department of Agriculture. He would have been told, said Mr. Despeissis, that ladybirds, as a class, were purely carnivorous, and preyed on other insects. Very few ladybirds fed on vegetables, and these were well-known—one in particular, which entomologists called *Epilachra*, had in seasons been very destructive in the Eastern States on plants of the pumpkin family, and also on tomatoes. No one who was acquainted with insects which preyed on cultivated crops was likely to make the blunder of introducing that class as beneficial insects. The letter referred to showed how easy it was for the uninitiated to be misled in confusing beneficial with noxious insects. In the case of *Leis conformis* and *Halizia mellyi*, forwarded by the Government Entomologist of Tasmania, there was no such blunder possible, the conformation of those insects making them essentially carnivorous. The question raised showed, however, how essential it was that only those well qualified to advise on the introduction of beneficial insects, or effect their acclimatisation, should be entrusted with such work.

By last week's mail a second consignment of the same ladybirds was received from Mr. Lea, the insects reaching Perth in good order. Colonies of these were liberated at Woodbridge and some of the moist gardens in Perth, where aphides are always numerous.

Keep the young fowls growing; feed well on sound food, and give plenty of bone-forming material; for young stock, ground cooked bones are the best. Bone-cutters cost from 30s. upwards, and repay their cost in no time. A good one is called “The Mann.” Buy a small hand mill—do not give too much soft food, but what is used should be freshly ground—one can then vary the diet by grinding various kinds of grain as required.

ANIMAL MANURES.

(The Tropical Agriculturist.)

A malodorous subject is the dung-hill, withal it is one of great and growing importance to the agriculturist and planter. I am afraid the best of us have more or less lamentably failed in grasping its full import in the economy of agriculture. As usual in matters of agriculture the Americans and Canadians are greatly to the fore in entering deeply into the subject.

I should suppose there is nothing more distressing to read than a lot of laboured statistics, yet some statistics are really eloquent and interesting. Of such a kind I conceive those in connection with manures of animal origin. For example the U.S.A. Department of Agriculture calculates there are in the States 16,000,000 horses, 53,000,000 cattle, 45,000,000 hogs and 45,000,000 sheep, and if these animals were kept in stalls the year round the fertilising properties of the manure produced would amount to 2,071,400,000 dollars. This enormous total is derived from a consideration of the value of nitrogen, phosphoric acid, and potash as commercial fertilisers.

I suggest very seriously to the Indian agriculturist that while we keep the mere phrase manure, we at the same time come to a serious consideration of the three great ingredients of the soil fertility, namely, nitrogen, phosphoric acid, and potash, and look into the matter in the same eminently practical business-like way the Americans do. A man sells 2,000 pounds of wheat; in that 2,000 lbs. of wheat he has also sold approximately R21.8 worth of nitrogen, phosphoric acid, and potash; that much of the fertility of his soil is gone, in other words that much of his capital account is for the time being absolutely depreciated. And consequently, unless such a one means to deduct so much from cash account, clearly he steadily works to nought, in other words he comes to a time when the sum total of the fertility of his soil is gone, save the indestructible residue, which will merely give the amount of crop derived from the fertilising properties of rain, and some consideration from rotation of crops, particularly legumes. This state of things may satisfy the Indian ryot, who apparently labors to merely live, or rather exist, and who would not labor at all if by any means he could exist without it; but the European planter, the intelligent zemindar, and the agriculturist who sees something in life more than mere existence should bestir himself to a much fuller appreciation of the commanding importance of animal manures in agriculture. Elaborate and conclusive investigation into the character of animal manures reveals a whole set of facts of great importance to the agriculturist; and many of which are sadly neglected, resulting in great loss to the soil and considerable

revenue to the producer. First, it is important to note that very quickly after being voided animal manures commence to ferment; horse and sheep manure very rapidly, and pig and cow manure more slowly. This ferment is due to minute organisms belonging to two great classes, those which demand an abundant supply of air and die without it, and those which grow without oxygen and die when exposed to it—known to science as aerobic and anaerobic ferments. In this matter of fermentation lay a great deal, indeed all the possibilities of a rich fertilising manure, or a blackened mass of comparatively worthless material largely depleted of its nitrogen, and phosphoric acid and potash.

Dr. Voelcker's experiments show that manure preserved in heaps under a cover after a year had lost 14 per cent. of its nitrogen, the same exposed 30 per cent., and in thin layers exposed 60 per cent. at the end of one year. Elaborate experiments by the Canadian Department of Agriculture show that after three months about, no advantage accrues from keeping manure; on the contrary a steady depreciation sets in. It would appear that by this time the micro-organisms of the manure and which, by the way are largely excreted with the manure, have done their work of breaking up and simplifying the organic portions of the manure quite sufficiently, and that after this period further decomposition out of the soil is more likely to represent a loss than gain of soluble fertilising matter, particularly nitrogen. This apart, the case is made out most abundantly for a system of preparing manure so that it shall retain all or nearly all its fertilising properties, *i.e.*, its nitrogen, potash, and phosphoric acid, and this can only be done to the best advantage under cover where it is not exposed directly to the sun, but most of all to heavy rains. Manures allowed to ferment their own way, and exposed to all weathers are very far from being what they look to be; indeed they may be likened to the glitter without the gold, the form without the substance, and since a worthless manure costs just as much to put on the field as a good one, the very serious loss is inexcusable. A simple and effective, and cheap arrangement is that of the French agriculturist who makes up two flats with cemented inclined bottoms, and between the two is a pit or small well, and into this is inserted a cheap manure pump for the purpose of systematically pumping out the drainings on to the manure heaps; if the draining is insufficient then water is added in droughty weather. The cardinal principle is to prevent a violent ferment, which sufficient moisture does, but the manure should also be compactly and firmly built up, so as to exclude excess of air which would give the aerobic ferment too much scope for action to the detriment of the manure. This is especially applicable to horse manure, which ferments rapidly and violently unless thoroughly wetted and well compacted. All sorts of odd places may do for the purpose of preparing manure where it exists in only reasonable quantities, but it should be under cover of some kind. The manure must be uniformly mixed, and if need be wetted and kept

from start to finish thoroughly moist and all drainings regularly returned to the manure; then when the manure is ready it should be promptly put on the field and ploughed in, or if this is not convenient I suggest the covering of it up with a layer of soil until required. Experiments and analysis go to show that manure merely tossed into a pit or heap and exposed to the elements lose half its fertilising matter in six months, while on the contrary carefully preserved and made manure under cover makes a difference of ten bushels of wheat and four tons of potatoes per acre.

People in this country seem to hold a high opinion of cow manure, but the U.S.A. Department of Agriculture gives the relative fertilising value of manures as follows:—Poultry, sheep, pigs, horse, cows, thus it will be seen cow manure comes last, but the sum total of manures from a cow is more than double that from a horse in the course of a year, and, moreover, the fertilising value of a manure does not exhaust its value by any means, least of all in a tropical country like India; a good dressing of cow manure will last much longer and show its effects long after a similar dressing of horse manure has disappeared.

Numerous analysis show that the value of all animal manures bears a direct relation to the kind of food they receive. For example, linseed and cotton seed meal abstract from the soil per ton 105 and 135 lbs. of nitrogen respectively. Turning to a table showing the amount of nitrogen in manure from many kinds of feeding stuff, linseed meal figures at 16 dollars worth of nitrogen per ton of manure. Cotton seed meal at 20 dollars ditto, whereas turnips figure at 0.48 and Indian corn meal at merely 453 per ton, and so on.

Analysis show that all manures contain from 50 to 95 per cent. of the fertilising matter contained in the food stuffs consumed, so it necessarily follows that the value of manure can be gauged roughly from the nature of the food given.

Animals which have reached maturity and do not grow, more or less, excrete practically all the fertilising matter of the food consumed. On the other hand milch cows and young growing animals excrete from fifty per cent. of the fertilising matter consumed.

The urine of animals varies considerably, but it is highly important to note the urine is even more valuable than the manure of some animals, containing as it does a large percentage of perfectly soluble fertilising matter, especially so in the case of horses, and sheep, but analysis show that urine, is nearly wholly deficient in phosphoric acid, and that by far the best plan to obtain an uniformly high fertilising manure is to use the urine with the solid manure.

The following table shows the immense importance of securing the urine of all animals, and represents the amount of nitrogen in solid and liquid after complete removal of water from both :—

NITROGEN.				Solid.		Liquid.	
				Per cent.		Per cent.	
Horses	...	...	...	2.08	...	...	10.0
Cows	...	...	...	1.87	...	...	10.0
Swine	...	...	...	3.00	...	...	12.0
Sheep	...	...	...	1.78	...	...	10.4

Generally one half and sometimes much more of the nitrogen excreted will be found in the urine, and a large portion of the potash, but little or no lime or phosphoric acid. Nearly all the potash and phosphoric acid in food stuffs is excreted by animals; and the urine is much richer in nitrogen than the solid matter, hence combination of both is the best of all.

But since urines are especially rapid and effective in setting up ferments, care at all times is required never to allow the heaps to over ferment or become dry, otherwise the loss of nitrogen in the shape mainly of ammonia becomes very great.

CONCLUSION.

(1.) It is a matter of first class paying importance for the agriculturist to give the strictest attention to his manure heap; (a) for the high rate of fertilising matter properly managed it may contain; (b) for the additional value in aerating and keeping the soil in good physical condition.

(2) Animal manures should be systematically kept moist and in this country well compacted into firm heaps under cover out of the way of the fierce sun-heat and rains.

(3.) No good purpose is served in keeping manure after three months out of the soil, but if unavoidable, a good plan would be to cover over the heap with a good layer of soil.

(4.) Cow and pig manures being of a slow, steady fermenting character should be mixed with rapid highly fermenting manures such as horse and sheep.

(5.) It is highly important to secure all urine and incorporate it with the manure.

(6.) The fertilising value of all animal manures bears a direct relation to the quality of the food stuff the animals receive, highly fed animals giving rich manures and poorly fed ones light manures.

(7.) The following substances are good for fixing the nitrogen of manures and generally preserving them: superphosphate, gypsum, and kainit (a manufactured form of potash) for cow and horse manure at the rate of about a pound per 1,000 lbs. of manure and for sheep and pig manure about 4 ounces per 1,000 lbs.

CAMELLIA.

GARDEN NOTES FOR FEBRUARY.

BY PERCY G. WICKEN.

This is the most trying month of the year for growing vegetables, and except in the South-Western portions of the State, or in a few favored moist positions inland, the supply of vegetables will be very short. The heat is in most parts very great, and unless water for irrigation purposes can be obtained and used judiciously, vegetables are hard to obtain. Much, however, may be done by deep cultivation, keeping the surface well stirred, and the application of plenty of stable manure to be used for mulching. Insect pests are likely to be troublesome, especially the Fruit-fly maggot. A sharp look-out should be kept for this maggot, and any fruit found invested should be at once destroyed.

Keep the ground well stirred, and hoe out all weeds. A number of plants will now be coming into seed. Go round these plants and put a mark on the best and those that are true to name, so that you can save the seed from them. Always save the seed from the best and healthiest plants. All weeds cut down this month should be raked up and burnt, or else placed on the compost heap, as many of them mature their seeds after being cut down and distribute them over the ground. By burning or placing on the compost heap, this is prevented and the seed destroyed.

All growers should be looking out for exhibits to show at the National Show next month, and those having perishable exhibits should send them to the Government refrigerating works, where they will be taken charge of and stored free of expense. Franked labels may be obtained on application to the Secretary.

BEET (RED).—A little seed may be sown. It requires a fairly rich ground, which has been well manured for the previous crop. Cover the seed about one inch deep and make the drills about 3ft. apart, and when well up thin the plants out to about 12 inches apart.

BEET (SILVER).—This is an excellent vegetable to grow during the hot weather. Sow the same as for Red Beet, or it may be sown in a seed bed and planted out. It requires fairly rich soil and plenty of well-rotted manure. The leaves of this plant are eaten, and also used for feeding stock. After the leaves are cut off fresh ones grow in a very short time.

FRENCH BEANS.—Should now be bearing well, and require to be well hilled up. Except in very favored localities it will be very little use planting out now.

MADAGASCAR BEANS should now be in full bearing. Leave some pods on the vine so as to mature a supply of seed for next year.

LIMA BEANS ought to be plentiful. Use all you can green, and let the remainder stop on the vine until thoroughly ripe, when the vines may be pulled up and the beans thrashed out with a flail. They can then be sold for seed or put by for future use. They are just as nice dried as when fresh.

CABBAGE AND CAULIFLOWER.—Make seed-beds large enough to produce sufficient plants for planting out later on. Where sufficiently moist a few plants may be put out at once, but they will require to be shaded from the sun. Get the land well worked ready to plant out after the rain.

CARROTS.—A small quantity can now be sown. The ground requires to be deeply worked, and no fresh manure should be applied, as this causes the roots to become forked. Some land that has been heavily manured for the previous crop is best. Cover the seed with very fine soil.

MELONS, WATER, ROCK AND PRESERVING.—These should now be in full bearing. Always cut melons as early as possible in the morning, before they get warm; they will carry and keep much better. Preserving melons, sliced or pulped and mixed with chaff, are excellent feed for cattle.

MAIZE should now be getting ripe in the warm districts, but should not be pulled until thoroughly dry.

SORGHUM will require to be hilled up and well cultivated. A little more may be sown for late feed.

PUMPKINS.—Those that are ripe should be stowed away in as cool a place as possible for future use.

SWEET POTATOES.—Keep the land well stirred between the rows, but not close enough to tear down the hills and disturb the roots. A few may be ripe enough for home use at the end of the month, but the bulk will not be ready until next month.

TOMATOES.—Plentiful supplies of this fruit are now to hand. Pick off and destroy all diseased fruits so as to prevent the spread of disease.

TURNIPS.—Plant out a plentiful supply of this crop. Those down last month will now require thinning. Thin out to at least 16 inches apart, so as to allow good roots to grow.

FARM.—Harvesting is now over, and the principal operations consist of thrashing, winnowing, and chaff cutting. Keep a lookout for bush fires, and plough fire breaks round all stacks not already protected. In travelling round the farming districts I notice many people carrying out the abominable practice of cutting up the string bands with the chaff. This causes the death of many horses, and anyone found doing this should be dealt with by law. Chaff is what is supposed to be sold, not string. It is only laziness on the part of the cutters where this is not done. It is just as easy to cut the band and pull the string off as to put it through the machine, and the string will be found very useful on the farm during the year, quite equal to the value it fetches when sold as chaff. In one or two places I notice farmers sewing their chaff bags with the string taken from the bands. This is an economical practice and much to be recommended. . . . Wherever practicable the land should be ploughed as soon as possible and left fallow until time to sow the next crop. Those who require feed for their sheep during the winter should now sow kale, rape, mustard, &c. I have been very successful with mangels sown during this month.

ANSWERS TO CORRESPONDENTS.

"Beginner" asks:—"What are the best manures for a winter crop of swedes and cabbage when stable manure is not obtainable?" The matter being referred to the Dairy Expert, Mr. Crawford replies:—"Much depends on the condition the land is in and whether or not it is deficient in nitrogen. The following will be found to be of great value: 2 cwt. superphosphate, 2 cwt. kainat per acre and 1 to 2 cwt. of nitrate of soda as a top dressing, or 2 cwt. of sulphate of ammonia mixed with the other manures.

Mr. A. L. Baker, of Quindalup, writes, asking as to the advisability of removing some three or four acres of apple trees two and a half miles from very low moist ground to hilly dry ground, and could it be done with safety? The age of the trees is stated to be ten years. He also asks: "Can you diagnose an affection of strawberry fruit whereby the fruit becomes withered and watery on one side while the other remains normal. The foliage also seems to assume a duller colour and appears unhealthy. A large number of my plants were affected in this manner, and resulted in considerable loss. Will you also tell me if irrigation prolongs the fruiting season or shortens it?" To the queries the Horticultural and Viticultural Expert, of the Department, replied:—"1. Transplanting apple trees: This may easily be done with trees such as those described at any time in the winter when the trees are dormant. Cut the branches hard back, pare with a sharp knife and paint the wounds with white lead or gum shellack paint. Remove as many of the roots as possible, and transplant in well dug holes. No other manure than a little phosphate need be applied on Karridale soil at time of transplanting. Mulch the ground in the early summer and keep it moist and cool. 2. Specimens of strawberry leaves and fruits would be necessary. Not unlikely to be the Bitter or Ripe Rot (*Glaesporium*). Spray with eau celeste or potassium sulphide ($\frac{1}{2}$ gallon of water) Too much wet, or excessive use of nitrogenous fertilisers, and especially stable manure, favours this disease. 3. Irrigation lengthens the fruiting season of the strawberry when employed discriminately.

Mr. A. Hansen, Kanowna, writes:—"I thought of keeping a few hives of bees; can you give me any information that will be of use to an amateur? Can any be bought in W.A.? Notes on butter making would also be of great use to me." The letter being referred to the Dairy and Bee Expert of the Department, elicited the following replies:—"The probability is bees will do well with you if you do not try to keep too many. Italian bees are easily procurable in this State. If you write to Messrs. C. and A. H. Smith, Sunnyside, Chidlow's Well; Mr. J. Sutton, Drakesbrook; or to Mr. Williamson, Glenferrie, York, they will give you prices for hives and bees complete. You will need hives of two stories. In the JOURNAL of the Department of Agriculture there is much useful information about bee-keeping, and Part VI. of the *Settlers' Guide* is solely devoted to butter-making. The JOURNAL is issued monthly, price 2s. 6d. per annum, the *Settlers' Guide*, containing six parts, bound in cloth, price 6s., may be had by applying direct to the Department of Agriculture.

MARKET REPORT.

FOR MONTH ENDING FEBRUARY 10.

The W.A. General Produce Co. report sales effected for the following articles, on account of various consignees, for the month ended February 10:—Sales effected during the past month were well patronised. Consignments slightly better, but not quite sufficient in so far as concerns potatoes, onions, butter, bacon, and eggs. The hitherto existing delay at Fremantle in obtaining delivery of goods imported from the East is still on, and numerous perishable goods suffer in quality in consequence. Bacon—Has risen in value in Sydney and Melbourne, and likely to again advance a little before long; locally, stocks

are very light, with demand very regular. Hutton's Hams—Had small consignment, which filled up immediate wants; expect some more early next week. Butter—Very much hardened in values f.o.b. Melbourne, owing to the great bush fires recorded within the last few days in some of the pastoral lands of Victoria naturally reducing the feed, which will mean a reduction in milk, and would not be surprised if prices of butter were to rise 1d. or 3d. per lb. very shortly; local supplies still very short. Cheese—In sympathy with the butter a rise has taken place f.o.b. Sydney and Melbourne, as per telegraphic information received this day. Eggs—Local supplies continue very short, with ready outlet for reliable fresh lots. Potatoes—Few consignments just arrived in fairly good condition from Melbourne, but shippers are somewhat afraid to risk sending, the premature condition of the potatoes being too new; of locally grown lots a few straggly bags arrive occasionally, but nothing near enough to supply the demand. Onions—Are also fairly scarce owing to their not being matured enough for shipping; few locally grown lots arriving and mostly of very good quality finding good payable outlet, and it is to be regretted that larger quantities are not grown within the State. Chaff—No material change to report; supplies and demand about balance, with values tending to ease. Bran and Pollard—Extremely scarce, with continued strong demand. Flour—Local selling well at usual prices. Oats—Unaltered in values, Tasmania quoting freely in White Stout feed, and we understand that several orders have been booked to arrive. Wheat—Very little offering here just now; evidently growers are holding off for better prices, which is doubtful as to being successful. Oil Cake—Finding usual outlet, and in particular the Singapore article, which is pure cocoanut, and poultry and cows seem to thrive feeding on it. Fruit—Supplies of late have been more in accordance with the demand, but values are not much improved yet; good sound lots of dessert apples, pears, and Muscatel grapes are realising fair prices. Vegetables—Improving slightly in price; especially good sound pumpkins find easy outlet. Salads are fairly plentiful. Poultry—Never before witnessed such a glut; hardly any demand for consignments forward; the trade (poulterers) have been supplied of late mostly with frozen lots, hence poor demand for live stock, and we advise readers to hold off for a little while. Game (such as wild duck) in good demand. Artificial manures—Hardly any business done.

Farm and Dairy Produce.—Bacon—Sides, from 10d to 11d per lb. Hams—Hutton's, 1s 1½d to 1s 2d; others from 1s per lb. Butter—Bulk, 1s 1½d to 1s 2d per lb, rising; tinned, 1s 3½d per lb. Lard—in one-pound and two-pound tins, 9½d per lb. Cheese—Medium, 8½d to 9½d; loaf, 9d to 9½d per lb, rising. Eggs—Local, 1s 8d to 3s 3d per doz. Potatoes—Local, £10 10s to £14; imported, £12 10s to £13 per ton. Onions—Worth 13s per cwt. Chaff—Worth from £4 10s to £5 5s per ton. Hay—Oaten, £4 10s per ton. Straw—£4 per ton. Bran—£6 15s to £7 per ton. Pollard—£7 to £7 10s per ton. Flour—Sacks, £9 per ton; quarters, £9 5s. Oats—White Stout, 3s to 3s 6d per bushel. Maize—Pure whole, 6s 6d per bushel. Wheat—4s, 4s 3d to 4s 6d, as per quantity. Oil cake—Singapore, £7 per ton; Peas—Dry, blue boiling, 7s per bushel.

Fruit.—Oranges, Italian, 17s 6d per case. Lemons—Italian, from 12s 6d to 18s per case, according to condition. Passion Fruit—7s 6d to 10s per case. Pineapples, varieties too numerous to mention, 4s, 5s, 6s 6d, 8s, 10s, and 12s per case. Figs—Worth 2d per doz. Peaches—From 4s, 5s, to 10s per case. Nectarines—From 3s to 6s 6d per case. Plums—From 2s 6d to 5s and up to 9s per case. Apples—Dessert, from 6s to 10s and up to 13s per case; cooking, 4s 6d to 7s per case. Pears—From 5s to 7s 6d to 10s to 17s 6d per case. Quinces—From 5s to 6s 6d per case. Melons—Rock, from 1s to 3s 6d per dozen; water, 4s to 6s per cwt.

Vegetables.—Cabbages—From 2s to 6s 6d per cwt. Carrots—1s 6d per doz' bunches. Parsnips—2s per doz. bunches. Turnips—White, 1s 6d per doz' bunches. Beans—French, 1d to 2d per lb. (hard to sell). Marrows and Pumpkins, 5s 6d to 6s 6d per cwt. Rhubarb, 1d to 1½d per lb. Capsicums and Chillies—Worth 4d to 6d per lb.

Salads and Herbs.—Lettuce—8d per doz. Spring Onions—8d per doz. bunches. Beetroot—2s per doz. bunches. Cucumber—1s to 2s per doz. Tomatoes—3s to 5s per case. Celery—2s 6d to 3s per doz. head. Cress—6d per doz. bunches. Thyme and Marjorum (off stalk)—6d per lb.

Poultry.—Fowls (table), 4s 6d to 5s per pair (slow selling); chickens no sale at all. Ducks—4s 9d to 5s 6d per pair. Geese—Worth 9s to 10s 6d per pair. Turkeys—Gobblers (in demand), 22s 6d per pair.

Game.—Black Duck—Worth from 3s to 4s per pair. Teale—Worth from 2s 6d to 3s pair. Mountain Duck—Worth 4s 6d to 5s pair. Hardhead Duck—3s to 3s 6d pair. Bluewing—2s to 2s 6d pair.

Carcase Meat.—Pork, 50 to 60 lbs., dressed, 6½d per lb.

Sundries.—Bonedust, £7 to £7 10s per ton. Phosphate, £4 10s per ton. Superphosphate, £6 10s per ton. Live Guano, £5 10s per ton. Dead Guano, £3 10s per ton. Coarse Bacon Salt, £3 10s per ton. New Cornsacks, 7s 6d; second-hand, 4s 6d per doz. New Bran Bags, 4s 7d; second-hand, 3s 6d per doz.

THE CLIMATE OF WESTERN AUSTRALIA DURING JANUARY, 1901.

It will be noticed that with the commencement of the new century the climatological report appears in a new form. Additional columns have been introduced showing the average for previous years, so that the figures for the current month can now be compared with the normals.

Unfortunately we possess only a very few years' records for our most interesting stations,—those on the Goldfields,—and this must be taken into consideration when making comparisons. It is hoped that the value of the report will be considerably enhanced by these additions.

There was nothing in the climate for January worthy of special mention. The atmospheric pressure throughout was fairly normal, and so was the temperature in the coastal districts. Inland, however, it was everywhere in excess of the average for previous years. The highest mean maximum was 106·5, at Nullagine, a figure closely approached by Cue with 104·6. The highest individual record was 115·2 at Onslow.

In the Kimberly district the rainfall was very patchy, some stations having considerably more, whilst others had considerably less, than the average for previous years. In the Marble Bar district a few heavy thunderstorms were experienced; but elsewhere throughout the State the fall was very light, the general report being nil, except on west and south coastal districts, where a few light showers fell.

The temperature at Perth during the summer has so far been about normal. In November the mean maximum was 80·8, and the average for previous years 79·4; in December it was 83·6 against an average of 83·5, and in January 88·6 against 88·0.

THE CLIMATE OF WESTERN AUSTRALIA DURING JANUARY, 1901.

Locality.	Barometer (corrected and reduced to sea level).				Shade Temperature.				Average for Previous Years.				Rainfall.	
	Mean of 9 a.m. and 3 p.m.	Average for previous years.	High-est.	Low-est.	January 1901.				Mean Max.	Mean Min.	Highest ever recorded.	Lowest ever recorded.	Points (100 to inch) in month.	Total points since Jan. 1.
					Mean Max.	Mean Min.	Mean of Month.	Highest Max.						
Wyndham	29.781	29.728	29.953	29.599	101.8	81.2	91.5	111.8	98.0	78.8	113.0	69.0	532	532
Derby	780	750	942	582	99.5	79.0	89.2	106.2	94.1	77.3	107.0	68.0	504	504
Broome	786	743	930	642	93.2	79.9	86.6	104.5	91.7	77.6	102.5	68.0	1031	1031
Condon	784	758	989	666	96.5	77.9	87.2	106.5	94.9	—	106.0	—	75	75
Cossack	802	711	961	631	100.0	79.9	90.0	109.4	98.2	78.0	119.0	60.0	Nil	Nil
Onslow	777	773	972	619	101.3	74.0	87.6	115.2	97.8	72.7	121.0	51.0	Nil	Nil
Carnarvon	848	794	991	687	87.7	70.2	79.0	109.7	89.5	68.4	114.0	52.0	Nil	Nil
Hamelin Pool	836	806	30.021	689	100.2	67.2	83.7	111.0	98.9	69.6	110.2	55.2	Nil	Nil
Geraldton	912	890	0.6	760	84.2	64.3	74.2	96.0	84.4	64.1	115.0	50.0	Nil	Nil
Hall's Creek	786	—	29.959	637	104.5	76.3	90.4	108.8	—	—	—	—	153	153
Nullagine	739	—	30.001	558	106.5	76.1	91.3	112.0	—	—	—	—	416	416
Peak Hill	762	—	29.951	469	103.9	77.3	90.6	109.7	—	—	—	—	Nil	Nil
Cue	866	792	30.001	621	104.6	73.9	89.2	114.0	102.5	74.2	113.0	54.8	Nil	Nil
Yalgoo	816	804	048	666	100.9	67.2	84.0	114.0	100.5	70.5	110.5	54.0	Nil	Nil
Laverton	847	—	120	637	100.1	72.8	86.4	109.3	—	—	—	—	1	1
Menzies	886	—	173	637	97.8	71.7	84.8	111.4	—	—	—	—	Nil	Nil
Kalgoorlie	904	845	164	475	97.4	68.0	82.7	108.7	95.8	68.4	113.2	48.0	Nil	Nil
Coolgardie	920	896	203	443	95.6	64.5	80.0	108.9	93.1	64.6	112.4	47.1	18	18
			153	533	95.3	62.7	79.0	107.6	93.2	62.8	112.2	46.0	6	6

The figures for previous years have been given whenever there was at least three years' complete records. This number is a very low one upon which to base averages, but otherwise the Goldfields would be excluded.

THE CLIMATE OF WESTERN AUSTRALIA DURING JANUARY, 1901.—Continued.

Locality.	Barometer (corrected and reduced to sea level.)				Shade Temperature.				Average for Previous Years.				Rainfall.		
	of age for 9 a.m. and 3 p.m. years.				January 1901.								Points (100 to points in inch) in month, Jan. 1.		
	Mean.	Aver. Prev. and ions years.	High- est.	Low- est.	Mean Max.	Mean Min.	Mean of Month.	Highest Max.	Lowest Max.	Mean Max.	Mean Min.	Highest ever re- corded.	Lowest ever re- corded.		
Southern Cross	...	...	...	...	...	...	...	...	...	...	...	...	...	Nil	Nil
York	916	875	134	572	97.7	65.0	81.4	113.0	52.2	95.2	63.1	115.0	44.0	1	1
Guildford	920	902	140	648	95.1	61.3	78.2	110.0	46.0	91.7	63.5	115.0	45.0	3	3
Perth Gardens	953	935	186	782	88.6	63.8	76.2	106.7	52.1	88.0	62.9	110.7	46.0	11	11
Perth Observatory	964	939	199	794	84.3	63.7	74.0	104.8	51.1	85.5	63.8	107.0	51.8	13	13
Fremantle	958	928	187	789	80.7	64.6	72.6	104.0	55.0	81.8	62.8	108.0	47.0	4	4
Rottnest	892	902	999	729	77.1	65.1	71.1	101.4	58.4	80.6	62.5	104.5	44.5	Nil	Nil
Mandurah	...	...	...	...	...	...	...	...	...	...	...	...	...	5	5
Collie	...	...	...	...	86.3	54.5	70.4	103.0	39.0	...	...	...	...	11	11
Bunbury	986	961	203	769	82.9	57.6	72.2	103.1	44.3	81.0	58.2	101.0	42.0	25	25
Busselton	...	...	...	...	81.9	55.9	68.9	99.2	41.0	...	...	...	...	10	10
Bridgetown	...	...	...	...	85.5	52.6	69.0	102.5	40.0	...	...	...	...	15	15
Karridale	30.007	30.003	191	739	76.3	57.2	66.8	93.5	43.5	75.9	57.2	98.0	42.3	27	27
Cape Leeuwin	29.996	29.979	231	681	74.4	62.9	68.6	83.5	37.0	73.2	62.2	91.6	51.0	31	31
Katanning	956	958	167	757	80.4	56.3	72.8	106.0	46.0	87.9	54.8	111.0	41.0	7	7
Albany	30.014	30.024	192	680	75.2	57.4	66.3	99.5	46.5	70.7	58.8	99.0	45.0	63	63
Breaksea	905	914	202	644	71.0	60.0	65.5	89.8	51.5	69.3	59.3	86.5	51.5	31	31
Esperance	906	904	204	622	70.1	60.1	69.6	107.6	45.6	77.3	59.3	117.0	44.5	44	44
Eyre	29.976	...	242	518	78.4	58.3	68.4	111.2	43.0	...	...	...	...	Nil	Nil

The figures for previous years have been given whenever there are at least three years' complete records. This number is a very low one upon which to base averages, but otherwise the Goldfields would be excluded.

W. E. COOKE, Government Astronomer.

RAINFALL FOR YEAR, 1900.

The following table shows the rainfall for last year throughout the State.

Returns from very distant places are not yet to hand, but it is considered better to publish the report now rather than wait for these to come in.

With the exception of the tropics north of Cossack, and the south coast between Albany and Israelite Bay, the fall was everywhere in excess of the average for previous years. In the N.W. and the Murchison, this excess amounted generally to more than 100 per cent., due principally to the heavy rains which swept through those districts in April. In the more settled districts it was generally from about 5 to 7 or 8 inches. Along the south coast the fall was about the same as the average for previous years, and in the tropics, north of latitude 20 deg., it was in every case considerably below. The greatest quantity recorded at any place was 59·02 inches at the Warren, and the least 8·40 at Hamelin Pool.

The following very brief note for each month will give an indication of the general character of the seasons in the southern portions of the State :—

January.—Unusually heavy in the S.W. districts.

February.—Very dry. Only a few coastal showers.

March.—Only a few showers in W. and S.W. districts. Rather heavier than usual on the goldfields.

April.—Great floods in the interior, which seem to have been confined well to the eastward of the Darling Range.

May.—Winter storms less severe than usual, and rainfall throughout the agricultural districts below the average for previous years.

June.—Considerably in excess of the average, especially between Geraldton and Albany.

July.—Again heavy in the extreme S.W., but elsewhere about normal.

August.—Very wet in coastal districts between Geraldton and Eucla. About normal on the goldfields.

September.—Very wet in the extreme S.W. and S., but elsewhere about normal.

October.—About an average.

November.—About an average.

December.—About an average.

W. E. COOKE,

Government Astronomer.

RAINFALL FOR YEAR, 1900.

(Principally from Telegraphic Reports).

STATIONS.	No. of points. 100 equals lin.	No. of wet days.	STATIONS.	No. of points. 100 equals lin.	No. of wet days.
EAST KIMBERLEY:			NORTH-WEST.—Cont.		
Wyndham	1634	...	Tambourah	2674	37
a6-Mile	1846	...	aaMulga Downs	1764	25
aCarlton	1635	...	aaMt. Florence	2623	31
Denham .. ..	...	...	Tambrey	3307	42
Newry .. ..	...	...	aaMillstream	3538	24
Rosewood Downs	1639	...	aaHong Kong	2633	33
Argyle Downs .. ..	...	...	Mallina .. ..	...	...
aLisadell	1084	...	Whim Creek	3585	44
Turkey Creek	1449	...	Cooyapooya	2987	36
Ord River	1275	...	Woodbrooke	2521	18
aaKoojubrin	967	32	Croydon .. ..	...	...
Hall's Creek	1782	47	Balla Balla	2525	36
aaFlora Valley	836	37	Roebourne	4173	32
Ruby Creek .. ..	...	...	Cossack	4003	34
aaDenison Downs	1191	28	Fortescue	2162	40
WEST KIMBERLEY:			Mardie	2239	36
aObagama	2192	44	aaMt. Stewart	1879	35
Derby	1690	40	Yarraloola	1979	29
Yeeda	1768	41	Chinginarra	2867	34
aLiveringa	1763	39	Onslow	2696	40
aMt. Anderson	1556	58	Peedamulla	2241	37
aLeopold Downs	1298	33	Red Hill	2482	41
Fitzroy Crossing	1709	52	Mt. Mortimer .. ..	...	...
aQuanbun	1342	34	aaWogoola	1725	...
aNookanbah	1626	44	aaNanutarra	1836	40
Broome	1842	49	aYanrey	1817	33
aaThangoo	1604	36	Point Cloates	2357	52
La Grange Bay	1525	41	GASCOYNE:		
NORTH-WEST:			Winning Pool	1743	42
Wallal	1503	30	Towara	1514	41
Condon	1905	29	Ullawarra	1573	33
DeGrey River	1208	25	Woorkadjia	1181	37
Port Hedland	1431	25	Thomas Police Station .. ..	...	...
Boodarie	1637	24	Bangemall .. ..	...	...
Yule River .. ..	...	...	Minnie Creek .. ..	...	...
Warralong	1464	25	Yanyareddy	1974	36
Muccan	1144	37	aWilliambury	1701	37
Mulgie	1320	23	Wandagee	1728	27
aEel Creek	1322	28	aaBoolathana	1771	42
Coongon	1142	17	Carnarvon	1475	50
Warrawagine	893	29	aaCooralya	1556	34
Bamboo Creek	1752	32	aaDoorawarrah	1376	31
Marble Bar	1753	36	Mungarra .. ..	...	...
Wanawoona	2280	36	Weenamiam .. ..	...	...
Corunna Downs	1850	33	Clifton Downs	1552	52
Nullagine	1576	37	Minginoo .. ..	...	...
			Errivilla .. ..	...	...

aDecember Missing.

aaNovember and December Missing.

Rainfall for Year, 1900.—Continued.

STATIONS.	No. of points. 100 equals 1 in.	No. of wet days.	STATIONS.	No. of points. 100 equals 1 in.	No. of wet days.
GASCOYNE—Continued.			SOUTH WEST DIVISION (N'RTN PART)—Cont.		
Dirk Hartog Is.	1632	75	Yuin	1422	58
Sharks Bay	1100	46	Northampton	2688	69
Kararang	1672	65	Mt. Erin	2592	84
Meedo	1335	56	Oakabella	1915	50
Tamala . . . . .	...	...	Narra Tarra . . . . .	...	...
Wooramel	1335	42	Tibradden	2551	71
Hamelin Pool	840	52	Sand Springs . . . . .	...	...
a Byro	1561	46	Mullewa	1259	45
Yarra Yarra . . . . .	...	...	aa Bootenal	1956	64
Berringarra . . . . .	...	...	Geraldton	2102	97
Mt. Gould	1964	35	Greenough	2610	80
Moorarie . . . . .	...	...	Dongara	2050	...
Peak Hill	2498	61	Dongarra (Pearse)	2000	82
Abbotts	1831	57	Strawberry . . . . .	...	...
Belele	1522	26	Minginev	2284	89
Mileura	1385	30	Rothsay	1593	81
Milly Milly . . . . .	...	...	Field's Find	1543	47
Manfred	1379	44	Carnamah	1956	91
Meelya . . . . .	...	...	Watheroo	1811	77
Woogorong . . . . .	...	...	Dandaragan	2847	104
Boolardy . . . . .	...	...	Moora	1843	92
Wooleane	1537	45	Yatheroo	3150	106
Dairy Creek . . . . .	...	...	Walebing	2195	102
aa Murgoo	1435	46	New Norcia	2695	109
Meka . . . . .	...	...	
Mt. Wittenoom . . . . .	...	...	
Nannine	1265	30			
Star of the East	1274	30			
a Annean	1464	39	SOUTH-WEST DIVISION, CENTRAL (COASTAL):		
Tuckanarra . . . . .	...	...	Gingin	4293	101
a Coodardy	1567	39	Belvoir	3309	97
Cue	1975	52	a Mundaring Weir	4451	114
Day Dawn	1640	41	Guildford	3752	107
Lake Austin	1361	48	a Canning Timber Mills	5013	107
Lennonville . . . . .	...	...	Kalbyamba	3832	121
Mt. Magnet	1372	54	Canning Waterworks	4091	107
Warracoothara . . . . .	...	...	Perth Gardens	3625	116
aa Challa	1036	34	" Observatory	3661	124
Youeragabbie	1254	36	Subiaco	3519	119
Murru . . . . .	...	...	Claremont	3685	119
Yalgoo	1294	51	" (Richardson)	3311	102
a Gabyon	1174	41	Fremantle	2741	121
Gullewa	1503	85	Rottneet	2576	120
			Rockingham	3377	102
SOUTH-WEST DIVISION (NORTHERN PART):			Jarrahdale	4986	109
Murchison House	1980	85	Mandurah	4188	114
Mt. View	1982	89	Pinjarrah	4555	99
			Harvey	4465	119

a December missing.

aa November and December missing.

Rainfall for Year, 1900.—Continued.

STATIONS.	No. of points. 100 equals lin.	No. of wet days.	STATIONS.	No. of points. 100 equals lin.	No. of wet days.
SOUTH-WEST, CENTRAL PART (INLAND) :			SOUTH-WEST DIVISION (SOUTH'RN PART)—Cont.		
Goomalling ... ..	...	...	Wilgerup ... ..	...	...
Momberkine ... ..	...	...	Mandalup	4365	103
Culham	2499	98	Bridgetown	4432	150
Newcastle	2798	90	Greenbushes	4855	...
Eumalga	2606	100	Williams	2489	85
Northam	1770	88	Arthur	2131	96
Grass Valley	1802	77	Darkan	2451	82
Meckering	1875	89	Wagin	1788	110
Dcongin	1574	66	Glencove	2090	83
Whitehaven ... ..	...	...	Dyliabing	1691	75
Mt. Stirling ... ..	...	...	Katanning	2133	...
Sunset Hill	1642	78	Kojonup	2223	97
Cobham	2131	106	Broomehill	1936	86
York	2110	99	Sunnyside	1874	115
Beverley	1776	79	Woodyarrup	1874	106
Barrington	1653	82	Cranbrook	1901	108
aSunning Hill	1858	68	Black Wattle ... ..	...	...
Wandering	3294	105	Mt. Barker	2699	143
Pingelly	1804	85	St. Werburgh's	2559	161
Marradong	3162	99	Forest Hill	3380	185
Bannister	3158	91	Denmark	4252	158
Narrogin	1823	98	Albany	3729	179
Wickepin	2123	95	Point King	3647	154
SOUTH-WEST DIVISION (SOUTHERN PART) :			Breaksea	2773	185
Burbury	4071	129	Wattle Hill ... ..	...	...
Collie ... ..	...	...	Cape Riche	2196	...
Glen Mervyn ... ..	...	...	Pallinup	1802	85
Dardanup ... ..	...	...	Bremer Bay	2169	103
Donnybrook ... ..	...	...	Jarramongup	1687	87
Boyanup	4041	128	EASTERN DIVISION :		
Preston ... ..	...	...	Lake Way	2803	51
Busselton	3780	...	Mt. Sir Samuel ... ..	...	...
Quindalup	3900	96	Lawlers	1523	66
Margaret River	5214	127	Lake Darlôt ... ..	...	...
Lower Blackwood	4723	115	Diorite King	1198	61
Karridale	5181	190	Sturt Meadows	1253	59
Augusta ... ..	...	...	Mt. Leonora	1290	55
Cape Leeuwin	4184	213	Mt. Malcolm	1216	53
Biddellia ... ..	...	...	Mt. Morgan	1084	56
The Warren	5902	152	Laverton	1550	50
Lake Muir ... ..	...	...	Murrin Murrin	1157	57
Mordalup ... ..	...	...	The Granites	948	46
Beeside ... ..	...	...	Tampa ... ..	...	...
Riverside	3495	166	Niagara	1129	43
Balbarup	4064	147	Yerilla ... ..	...	...
			Edjundina ... ..	...	...

a December missing.

aa November and December missing.

Rainfall for Year, 1900.—*Continued.*

STATIONS.	No. of points, 100 equals lin.	No. of wet days.	STATIONS.	No. of points, 100 equals lin.	No. of wet days.
EASTERN DIVISION.— <i>Cont.</i>			EASTERN DIVISION.— <i>Cont.</i>		
Menzies	1217	58	Southern Cro. s... ..	1129	62
Mulline ... ..	...	...	Mt. Jackson	1205	55
Goongarrie	943	45	Boodallin ... ..	...	...
Kurawa	1018	60	Burracoppin	1256	...
Dixie Gold Mine ... ..	...	...	Kellerberrin	1581	79
42-Mile ... ..	...	...	Mangowine	1299	67
Kurnalpi	1128	63	Wattoning ... ..	...	...
Bulong	996	69			
Kanowna	1022	71	EUCLA DIVISION :		
Kalgoorlie	1171	69	Coconarup	1474	102
Coolgardie	1197	76	Fanny's Cove	2799	110
Burbanks ... ..	...	...	Park Farm	2667	111
Londonderry	1284	84	Esperance	2930	...
Woolubar ... ..	...	...	Gibson's Soak	2409	90
Widgemooltha	1294	64	30-Mile Condenser	2080	58
50-Mile Tank	1348	69	Swan Lagoon	2003	136
Norseman	1253	67	Grass Patch	1912	115
Bulla Bulling	1098	46	Lynburn ... ..	...	...
Woolgangie	1203	...	Israelite Bay	1498	81
Boorabbin	1337	67	Balladonia	1515	63
Karalee	1416	56	Eyre	1664	...
Yellowdine	974	...	Eucla	1705	89

The Observatory, Perth,

January 31st, 1901.

W. E. COOKE,

Government Astronomer.

ANSWERS TO CORRESPONDENTS.

GRUB PEST.—A settler writes :—" A pest in the shape of a green caterpillar with a horn (called by some the elephant caterpillar), appeared this year in large numbers, even in vineyards that have only just been formed, and stripped the young vines of all their leaves. A few have been seen in previous years, but this year so many came that there was hardly a vine left untouched. Is it likely a similar visitation may be expected next year, and if so what would be the best preventive?" This is evidently the grub of the " Hawkmoth of the vine." It is very prevalent this season, and the only effectual remedy is that of hand-picking.

In hot parts of the State it is useless hatching at this season; young chickens do not grow well during great heat. Separate the sexes as soon as the cockerels begin to show up and get their tails and combs. Much trouble is saved, and the birds grow better.

**RAINFALL for Dec., 1900 (completed as far as possible),
and for Jan., 1901 (principally from Telegraphic Reports).**

STATIONS.	DEC.		JAN.		STATIONS.	DEC.		JAN.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
EAST KIMBERLEY:					N'TH-WEST—Cont.				
Wyndham ..	133	..	532	..	Tambrey ..	37	1	..	..
6-Mile ..	211	6	460	6	Hong Kong ..	..	..	..	..
Carlton ..	..	..	..	..	Mallina ..	Nil	..	..	..
Denham ..	..	..	..	..	Whim Creek ..	Nil	..	18	2
Rosewood Downs ..	351	..	..	..	Cooyapooya ..	Nil	..	..	..
Argyle Downs ..	..	..	..	..	Woodbroke ..	Nil	..	..	..
Lisadell ..	..	..	..	..	Croydon ..	17	2	..	..
Turkey Creek ..	118	7	460	13	Balla Balla ..	Nil	..	33	2
Ord River ..	..	..	..	..	Roebourne ..	Nil	..	21	1
Koojubrin ..	..	..	..	..	Cossack ..	Nil	..	Nil	..
Hall's Creek ..	73	..	153	..	Portescue ..	Nil	..	Nil	..
Flora Valley ..	..	..	..	..	Mardie ..	Nil	..	..	..
Ruby Creek ..	..	..	323	11	Mt. Stewart ..	..	..	..	..
Denison Downs ..	..	..	..	..	Yarraloola ..	..	..	..	..
WEST KIMBERLEY:					Chinginarra ..	Nil	..	..	..
Obagama ..	..	..	..	..	Onslow ..	Nil	..	Nil	..
Derby ..	249	..	504	..	Red Hill ..	Nil	..	..	..
Yeeda ..	89	5	..	..	Mt. Mortimer ..	2	1	..	..
Liveringa ..	..	..	..	..	Wogoola ..	Nil	..	..	..
Mt. Anderson ..	..	..	..	..	Nanutarra ..	10	2	..	..
Leopold Downs ..	..	..	..	..	Yanrey ..	Nil	..	..	..
Fitzroy Crossing ..	251	8	710	11	Point Cloates ..	Nil	..	..	..
Quanbun ..	..	..	..	..	GASCOYNE:				
Nookanbah ..	..	..	..	..	Winning Pool ..	Nil	..	80	1
Broome ..	32	2	1031	..	Towara ..	Nil	..	..	..
Thangoo ..	..	..	..	..	Ullawarra ..	50	1	..	..
La Grange Bay ..	19	2	160	5	Woorkadjia ..	Nil	..	..	..
NORTH-WEST:					Minnie Creek ..	Nil	..	..	..
Wallal ..	4	2	152	4	Yanyearreddy ..	Nil	..	..	..
Condon ..	13	..	75	..	Wandagee ..	Nil	..	..	..
DeGrey River ..	Nil	..	..	..	Carnarvon ..	1	1	Nil	..
Port Hedland ..	Nil	..	Nil	..	Cooralya ..	..	..	..	..
Boodarie ..	..	..	..	..	Clifton Downs ..	4	1	..	..
Yule River ..	..	..	..	..	Dirk Hartog Is. ..	Nil	..	..	..
Warralong ..	80	1	..	..	Sharks Bay ..	Nil	..	Nil	..
Muccan ..	1	1	..	..	Kararang ..	Nil	..	..	..
Mulgie ..	Nil	..	..	..	Meedo ..	25	1	..	..
Eel Creek ..	..	..	..	..	Tamala ..	Nil	..	..	..
Coongon ..	105	2	..	..	Wooramel ..	51	1	Nil	..
Warrawagine ..	73	3	..	..	Hamelin Pool ..	20	2	Nil	..
Bamboo Creek ..	88	4	168	5	Byro ..	31	2	Nil	..
Marble Bar ..	8	2	205	4	Mt. Gould ..	Nil	..	..	..
Warrawoona ..	49	2	132	3	Peak Hill ..	4	2	Nil	..
Corupina Downs ..	12	1	..	..	Abbotts ..	14	1	Nil	..
Nullagine ..	6	..	416	..	Belele ..	Nil	..	..	..
Tambourah ..	107	3	199	3	Mileura ..	20	2	Nil	..
Mulga Downs ..	..	..	..	..	Manfred ..	8	1	..	..
Mt. Florence ..	..	..	..	..	Meelya ..	Nil	..	..	..
					Woogarang ..	11	2	..	..

RAINFALL.—Continued.

STATIONS.	DEC.		JAN.		STATIONS.	DEC.		JAN.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
GASCOYNE—Cont.					S. W. Div.—Cont.				
Wooleane ..	14	1	2	1	Belvoir ..	34	2	10	1
Dairy Creek ..	8	2	..	..	Guildford ..	23	2	3	2
Meka ..	31	1	Nil	..	Canning Timber	..	..	..	..
Mt. Wittenoom ..	37	2	5	..	Mills ..	..	..	..	..
Nannine ..	Nil	..	Nil	..	Kallyamba ..	50	2	..	..
Star of the East ..	Nil	..	..	..	Canning Water-	..	..	..	..
Tuckanarra ..	Nil	..	Nil	..	works ..	105	2	..	..
Cue ..	13	1	Nil	..	Perth Gardens ..	56	2	11	2
Day Dawn ..	Nil	..	Nil	..	Observatory ..	52	3	13	2
Lake Austin ..	Nil	..	Nil	..	Subiaco ..	74	2	22	2
Lennonville ..	9	1	..	..	Claremont ..	41	2	1	2
Mt. Magnet ..	Nil	..	8	1	„ (Richardson) ..	39	2	..	..
Challa ..	Nil	..	Nil	..	Fremantle ..	20	2	4	2
Youeragabbie ..	Nil	..	..	..	Rottneft ..	25	4	Nil	..
Murrum ..	20	1	..	..	Rockingham ..	54	3	5	1
Yalgoo ..	98	2	Nil	..	Jarrahdale ..	17	1	33	2
Gabyon ..	35	2	Nil	..	Mandurah ..	143	2	5	2
Gullewa ..	43	2	15	1	Pinjarrah ..	11	2	11	2
					Harvey ..	105	6	18	2
SOUTH-WEST DIVI- SION (N'N PART):					SOUTH-WEST, CEN- TRAL PART (IN- LAND):				
Murchison House ..	..	..	..	..	Momberkine ..	56	3	..	..
Mt. View ..	Nil	..	..	..	Culham ..	57	2	2	1
Yuin ..	8	1	..	..	Newcastle ..	40	1	Nil	..
Northampton ..	Nil	..	Nil	..	Eumalga ..	40	2	..	..
Mt. Erin ..	Nil	..	Nil	..	Northam ..	58	2	Nil	..
Oakabella ..	Nil	..	..	..	Grass Valley ..	43	2	Nil	..
Narra Tarra ..	Nil	..	..	..	Meckering ..	40	2	4	1
Tibbradden ..	1	1	..	..	Doongin ..	102	2	..	..
Sand Springs ..	11	1	..	..	Sunset Hill ..	25	1	Nil	..
Mullewa ..	Nil	..	60	1	Cobham ..	40	2	Nil	..
Geraldton ..	2	1	Nil	..	York ..	34	1	1	1
Greenough ..	Nil	..	Nil	..	Beverley ..	31	1	Nil	..
Dongara ..	3	1	1	1	Barrington ..	28	2	..	..
Dongara (Pearse) ..	4	1	1	1	Sunning Hill ..	74	1	Nil	..
Strawberry ..	Nil	..	..	..	Wandering ..	145	2	12	2
Minginew ..	9	2	Nil	..	Pingelly ..	71	2	5	2
Rothsay ..	..	..	..	..	Marradong ..	60	3	15	2
Field's Find ..	67	2	..	..	Bannister ..	64	2	5	2
Carnamah ..	36	2	Nil	..	Narrogin ..	75	3	3	1
Watheroo ..	Nil	..	Nil	..	Wickepin ..	136	4	..	..
Dandaragan ..	78	2	4	1					
Moora ..	11	2	35	1	SOUTH-WEST DIVI- SION (S'N PART):				
Yatheroo ..	88	3	9	1	Bunbury ..	26	7	25	..
Walebing ..	39	3	1	1	Collie ..	129	5	11	4
New Norcia ..	50	3	..	..	Glen Mervyn ..	181	5	24	3
SOUTH-WEST DIVI- SION, CENTRAL (COASTAL):					Dardanup ..	39	3	36	3
Gingin ..	76	2	15	2	Donnybrook ..	77	8	11	2
					Boyanup ..	93	7	5	2

RAINFALL.—Continued.

STATIONS.	DEC.		JAN.		STATIONS.	DEC.		JAN.	
	No. of points. 100 equals 1in.	No. of wet days.	No. of points. 100 equals 1in.	No. of wet days.		No. of points. 100 equals 1in.	No. of wet days.	No. of points. 100 equals 1in.	No. of wet days.
SOUTH-WEST—Cont.					EASTERN DIVISION.				
Busselton ..	78	9	10	5	— Continued.				
Quindalup ..	41	8	6	3	Mt. Leonora ..	Nil	..	16	2
Margaret River ..	94	2	26	1	Mt. Malcolm ..	1	1	..	..
Lower Blackwood ..	59	3	5	1	Mt. Morgans ..	5	1	Nil	..
Karridale ..	58	9	27	7	Laverton ..	7	2	Nil	..
Augusta ..	57	9	28	5	Murrin Murrin ..	Nil	..	Nil	..
Cape Lecuwin ..	87	12	31	13	The Granites ..	5	1	12	1
Riddellia ..	71	3	60	1	Tampa ..	Nil	..	..	..
The Warren ..	81	5	60	6	Niagara ..	Nil	..	31	2
Lake Muir ..	83	5	30	7	Yerilla ..	1	1	10	2
Mordalup ..	75	11	28	6	Menzies ..	5	1	Nil	..
Deeside ..	112	7	..	..	Goongarrie ..	21	1	Nil	..
Riverside ..	114	8	43	6	Kurawa ..	72	1	4	2
Balbarup ..	194	8	44	4	Dixie Gold Mine	110	1	..	..
Wilgerup ..	124	4	38	2	Kurnalpi ..	20	1	53	..
Mandalup ..	134	4	15	2	Bultong ..	32	1	23	1
Bridgetown ..	188	5	15	3	Kanowna ..	81	1	Nil	..
Greenbushes ..	176	..	24	4	Kalgoorlie ..	72	1	18	..
Williams ..	70	1	5	1	Coolgardie ..	141	1	6	..
Arthur ..	117	3	4	2	Burbanks ..	129	2	6	2
Darkan ..	33	3	7	1	Londonderry ..	141	2	9	1
Wagin ..	86	2	4	2	Woolubar ..	120	1	41	2
Glencove ..	151	4	5	2	Widgiemooltha ..	137	1	15	3
Dyiliabing ..	174	2	10	2	50-Mile Tank ..	103	1	Nil	..
Katanning ..	117	2	7	..	Norseman ..	110	2	25	1
Kojonup ..	60	2	10	1	Bulla Bulling ..	126	1	Nil	..
Broomehill ..	68	2	5	2	Woolgangie ..	148	1	..	..
Sunnyside ..	110	7	11	2	Boorabbin ..	152	1	Nil	..
Woodyarrup ..	158	4	9	2	Karalee ..	72	1	..	..
Cranbrook ..	70	3	15	1	Yellowdine ..	70	1	Nil	..
Blackwattle ..	23	2	30	1	Southern Cross ..	27	1	Nil	..
Kendenup ..	..	..	25	2	Mount Jackson ..	80	1	Nil	..
Mt. Barker ..	123	5	36	4	Burracoppin ..	7	1	Nil	..
St. Werburgh's ..	120	8	..	..	Kellerberrin ..	122	2	Nil	..
Forest Hill ..	101	6	47	6	Mangowine ..	1	1	..	..
Denmark ..	72	6	71	7	EUCLA DIVISION :				
Albany ..	65	9	63	8	Coconarup ..	66	5	..	..
Point King ..	71	4	58	5	Fanny's Cove ..	164	5	..	..
Breaksea ..	112	10	31	5	Park Farm ..	201	4	..	..
Cape Riche ..	12	3	..	..	Esperance ..	195	7	44	..
Pallinup ..	22	4	13	2	Gibson's Soak ..	168	4	..	..
Bremer Bay ..	114	3	15	1	30-Mile Condenser	113	2	..	..
Jarramongup ..	21	3	..	..	Swan Lagoon ..	122	6	..	..
EASTERN DIVISION :					Grass Patch ..	102	4	..	..
Lake Way ..	Nil	..	..	..	Lynburn ..	220	2	..	..
Mt. Sir Samuel ..	Nil	..	Nil	..	Israelite Bay ..	155	1	14	1
Lawlers ..	Nil	..	1	1	Balladonia ..	118	2	Nil	..
Diorite King ..	Nil	..	21	2	Eyre ..	12	..	Nil	..
Sturt Meadows ..	Nil	..	..	..	Eucla ..	40	3	1	1

The Observatory, Perth, Feb. 8, 1901.

W. E. COOKE, Govt. Astronomer.

RETURN OF FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING JANUARY, 1901.

NAME OF PORT	No. of Ships.	No. of Consign- ments Inspected.	Total No. of Cases.	No. of Cases Passed.	No. of Cases Prohibited.	No. of Cases Destroyed.	No. of Cases in Quarantine.	No. of Cases Dipped.	No. of Cases of																
									Appricots.	Bananas.	Cherries.	Gooseberries.	Grapes.	Lemons.	Nectarines.	Oranges.	Passion Fruit.	Peaches.	Plums.	Rhubarb.	Strawberries.	Pomeloes.	Pines.	All other fruits.	
FREMANTLE ..	10	18	2525	2525	..	..	..	2525	..	..	259	..	..	1034	..	240	..	..	962	..	..	..	..	..	1
ALBANY ..	4	7	215	190	25	..	..	215	24	..	77	..	..	..	..	..	..	..	88	..	..	..	..	8	..
GERALDTON ..	1	1	3	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMELIN ..	1	1	1	1	..	..	..	1	..	..	..	..	..	..	1	..	..	..	..	..	..	..	..	..	..
BUSSELTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL ..	16	27	2744	2719	25	..	..	2541	24	..	866	..	..	1035	..	240	..	..	1050	..	..	..	..	8	1

DEPARTMENT OF AGRICULTURE,
8th February, 1901.

RETURN OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING JANUARY, 1901.

NAME OF PORT.	No. of Ships.	No. of Consign- ments of Trees or Plants.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments Passed.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments of Trees or Plants Prohibited.	Total No. of Trees or Plants in such Consignments.	No. of Packages Dipped.	No. of Trees.											
									Ornamental & Pot Plants.	Almonds.	Apples.	Apricots.	Cherries.	Figs.	Lemons.	Limes.	Mulberries.	Oranges.	Peaches.	Pears.
FREMANTLE ..	3	3	220	3	220	..	..	4	220	..	..	..	..	..	..	..	..	..	..	..
ALBANY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
GERALDTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMELIN ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSETTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL ..	3	3	220	3	220	..	..	4	220	..	..	..	..	..	..	..	..	..	..	..

DEPARTMENT OF AGRICULTURE,
8th February, 1901.

Agricultural Lectures.

IT is intended to give a course of Agricultural Lectures, by special request of the Inspector-General of Schools and by permission of the Secretary of the Department of Agriculture, at the Perth Technical School, St. George's Terrace, by MR. PERCY G. WICKEN, M.H.A.C., of the Department of Agriculture,

**Commencing on Monday Evening, Feb. 18,
at 7.30 p.m.**

Popular fees will be charged, viz., 20s. for the year, or 7s. 6d. per quarter; single lecture, 1s.

The course will be made as instructive as possible, and the subjects will be dealt with from a practical point of view, avoiding as far as possible scientific details, and will be made suitable to those about to take up land, and possible settlers desiring to accumulate agronomic knowledge. The following subjects will be dealt with:—

Soil and its preparation	Root Crops
Implements of the Farm	Vegetables
Drainage	Special Products of the Farm
Irrigation	Ensilage
Manures	Live Stock
Cultivation of Crops	Orchard Work
Culture of Grass Lands	Dairy Work, &c.

During the course Excursions will be made on SATURDAY AFTERNOONS and PUBLIC HOLIDAYS to Orchards, Farms, Machinery Depôts, or other places of interest connected with Agriculture.

EMPLOYMENT WANTED.

FARMER'S SON Wants Employment on Cattle Station or Fruit Farm. Salary required, £3 to £4 per month, and board and lodgings with family.

REPLY 120/111, THIS OFFICE.

NOTES.

LARGE STACK OF WHEAT.—No better proof of the fruitfulness of the West Australian soil could be given than the large stack of wheat which is to be seen in the grounds of the Empire Milling Company, of York. The stack is the largest ever built in the State, and contains close on 10,000 bags, equal to 40,000 bushels of wheat. Any persons who have been in the Eastern States, when passing through the York station, could quite imagine themselves in the far-famed Wimmera wheat district of Victoria, as the stack stands in full view from the railway station.

PROPER FORM OF A PIG.—The form of the pig would be improved were breeding animals deeper-bodied and longer-ribbed, thus giving more side meat. Too many pigs have very broad backs after extended feeding, while the body is lacking in depth and the belly is narrow. Such a type of pig is frequently seen in the showyard, and it is not a desirable form. There is too much lard present, and not enough bacon. Too many of our breeding boars are lacking in the very qualities described above, but so long as the backs are broad, fat, and straight, breeders seem satisfied. If some of the breadth of back could be changed into depth of body, a great improvement would be made. Furthermore, it is this deep-bodied type of female that raises the largest litters of pigs and produces the most milk.

THE USE OF ICE IN BUTTER-MAKING.—There is no more useful and economical plan of using ice than in the cream in churn or in the water in which the butter stands for a time before being made up. The ice is used in hot weather to make the butter firm, and unless the weather is hot is not needed. Whether ice is required or not, even in hot weather, depends upon the temperature of the water. With a really cold spring to go to, the butter may generally be made up firmly enough without adding ice to it, or rather the water in which it is placed. Then as regards the storing of the butter: a cold apartment would keep it in an approved state, while a warmer one would need ice in some form to keep it from getting soft and sticky. Points vary somewhat in different parts of the country, but flavour, texture and colour are mostly considered in all parts.

BREAKING-IN HORSES.—There are a great number of good horses spoilt through not being properly broken. The average colt breaker knows little or nothing of riding beyond sticking on. When mounted, the rider should sit erect and easy in the centre of the saddle; his legs should be close to the colt's sides, the heels slightly sunk, and toes raised and drawn back in line with point of the knee. He should have a light and equal feeling of the colt's mouth, which he should ease and feel with each step, at the same time pressing him up with the legs, but must not do more with the

legs than he can hold with the hand. When the colt walks boldly forward he may be taught to turn; if to the right, by a double feeling of the right rein (not by pressing the rein on the neck) and a stronger pressure of the right leg, at the same time using the left rein and leg to keep the colt up to his work, and prevent him throwing his haunches round. When the colt has been taught to turn to the right and left he may be taught bending, for which there are proper aids, which would take up too much space to explain here. The use of bending lessons are to make the colt supple in the neck and ribs, and teach it to obey the hand and leg. When the colt walks freely and well he may be trotted and afterwards cantered, to bring him from the trot to the canter. The rider should feel both reins and close both legs, outward leg and rein the strongest, to cause the colt to break off true and united. The colt when true and united will lead with the inward fore leg, followed by the inward hind leg. When false he will lead with the outward fore, followed by the outward hind. When disunited he will lead with one fore, followed by the opposite hind, and will give his rider a very rough ride.

SAND-DRIFTS.—Mr. Charles R. Heath, A.R.V.I.A., Geraldton, has forwarded to the Department of Agriculture the following notes on the success of rye as a sand-stay, and the failure of marram grass in that district:—"In your January number of the JOURNAL appears an article on some work done by the Government Resident, at Geraldton, in reclaiming some of the Champion Bay sand drifts by planting couch and covering with ti-tree brush. This is the best means we have here to stop sand drift, but it has one objection, which is becoming fatal when done by other than convict labor, viz., its increasing cost. Ti-tree is now becoming very scarce around Geraldton, and the cost of covering ground with ti-tree brush is now £20 per acre. This, in some instances, is more than the land itself is worth. At the end of last winter I had to supervise two works connected with the levelling of sand hills, one being the formation of a cricket and football ground in the Queen's Park for the Geraldton Municipal Council, and the other the levelling of the Geraldton Agricultural Society's new show grounds. The land in each instance was a fine, white sand, covered with a heavy growth of wattle, and when denuded of the wattle and levelled, would have drifted badly in the heavy summer winds prevailing here. The plan I pursued was to sow the ground with rye after levelling, and then immediately plant roots of the couch grass. Although this work was done later in the winter than it should have been, it has succeeded admirably. The rye effectually stops the action of the wind upon the sand, until the couch has time to spread, and the cost is a bagatelle compared with the cost of brushing. This plan, of course, is only applicable to places where the ground is surrounded by a stock-proof fence. Marram grass,

to which I have seen reference in your JOURNAL as a good stay for sand-drift, has been a failure here. The town council, years ago, on two occasions, imported some and planted it out on the sand hills, but it soon disappeared. Some four years ago, Dr. Penny, who had seen marram growing on the sand hills near Port Fairy (Vic.), imported several bags, and presented them to the council, and, under instructions from them, I planted it in what was then bare sand in the Victoria Square. It was planted in the middle of the rainy season, and apparently took root and sent out new growth, and appeared to be growing splendidly, but as the summer wore on, it turned brown and never recovered. Either there is something in the sand here unsuited to the marram, or else our long rainless summers are too severe for it. At the same time I planted, in the same place, some roots of a native grass (very similar in appearance to marram) that grows along our foreshore, and this grass has thriven splendidly, and would make a good sand-stay."

EXTINCT GLACIERS AT MOUNT KOSCIUSKO.—Mr. R. Helms, formerly attached to the staff of the Department of Agriculture in this State, has forwarded to the Secretary of the Department an extract from the *Sydney Daily Telegraph* of February 14, with reference to the discovery of further extinct glaciers at Mount Kosciusko. The extract is as follows:—"It will be of interest to tourists to Mount Kosciusko to know that within the last few days beautiful additional evidences of extinct glaciers have been found in that district. A party consisting of Mr. F. B. Guthrie and Mr. Richard Helms, of the Department of Agriculture, and Professor David, of the Sydney University, have recently found, chiefly in the neighborhood of the Blue Lake, that the granite rock for acres in extent, is deeply rutted and grooved by glacier ice, which must have been at least 200 ft. in thickness. These ice-grooved rock surfaces, though somewhat obscured by weathering, are still wonderfully perfect, and are comparable to those of the most typical glacial regions of the Northern Hemisphere. Near the lake called Hedley Tarn there are four fine terminal moraines, each about 100 ft. high, and a fifth forms the dam of the Blue Lake. Ice-striated boulders were found in these moraines, as well as in the perfect terminal moraines of Lake May or Cootapatunga Lake. A perfect moraine, with numerous ice-striated boulders and glaciated pavements, was also found near the head of the Snowy River, about a mile and a half northerly from the Kosciusko Observatory. The results of this geological examination have entirely confirmed the original views of Mr. Helms, as published several years ago in the proceedings of the Linnean Society of Sydney; and also, in part, support the earlier views of Professor Leudenfeld, and prove that Australia has passed through a glacial epoch in comparatively recent time, perhaps synchronous with the Great Ice Age of the Northern Hemisphere."

THE INSECTIVOROUS BIRDS OF WESTERN AUSTRALIA.

BY ROBERT HALL.

TITS.

Tom-tits and other tits form a strong section of our avifauna. True Tits (*Acanthiza*) though feeble in species are numerically strong, while their ally the Tree Tit is but one remove from them in structure and in habit. The Shrike-tit is added because there is some likeness in habit, and a name that helps us in a general consideration of small and useful birds. A very little bird with the long name *Pseudogerygone* attached to it is called a Fly-eater. This is practically what a tit is, and it will be quite in keeping to consider it under the present head and in the first place, while dealing with the economy of birds.

WESTERN FLY-EATER (Western Gerygone).

Pseudogerygone culicivora, Gld. *Su-do-jev-i-go-ne ku-li-siv' o ra*.

Pseudos, false; *gery*, changeable; *gone*, generation; *Culex*, a gnat; *vorare*, eat.

Gerygone culicivora, Gould, "Birds of Australia," fol., vol. ii., pl. 99. "Key to the Birds of Australia," Hall, p. 14 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 9, 8, 6.

KEY TO THE SPECIES.—General appearance brown; abdomen whitish; ear coverts and throat of same color (grey). Second primary about equal to secondaries; subterminal black band on tail feathers which are white at base. Total length 4 inches; bill 0.5 inch; wing 2.2 inches.

I do not remember ever hearing so sweet a bird-voice as when I heard this little bird singing in the tops of the highest trees in the forest west of Albany. It was quite a lullaby. I was further surprised after a long search with my eyes, to learn that a bird, less than four inches in length, had so powerful a voice.

It is well distributed through the South-Western portion of the State in either the scrub or large timber, and is during the day in continuous search for small insects. Like most of the tits, it seeks for food with a scrutinising care, prying into places that larger birds would consider unworthy of their attention.

Hitherto this species has been recognised as a bird found principally in the South-West, and extending along the South as far as Southern New South Wales in a recent year. For this reason the vernacular name is claimed as the Southern Fly-eater.

However, my correspondent at Derby lately came to the rescue and sent me a preserved skin from the Fitzroy River. This ensures the species as a true Western one, using Victoria rather as an outflank than as a main station. This is the more interesting as the genus is made up of seven species, six of which are found

only in the Eastern and Northern parts of the Continent, occupying about one half of the coast line of Australia, while the present species has a range along the other half, *i.e.*, Derby to Melbourne.

BROAD-TAILED TIT (Western *Acanthiza*).

Acanthiza apicalis, Gld. (*A-kan' thi' za ap-i-ka' lis*).

Akanthis, a linnet; *apicalis*, pertaining to the apex.

Acanthiza apicalis, Gould "Birds of Australia," fol., vol iii., pl. 57. "Key to the Birds of Australia," Hall, p. 25 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 9, 7.

KEY TO THE SPECIES.—Band on tail subterminal with distinct white tips & inner webs of tail quills; throat ashy white; head like back, except scaly feathers on forehead; throat and breast perceptibly streaked with dusky black; upper tail coverts rufous brown; frontal feathers black, with whitish margins.

This plain-plumaged little bird that appears with nothing special to recommend it to our particular notice, is one of the most important of birds. The fact that its food is composed of insects of small size, such as aphides, mosquitoes, and others, is in itself a matter of much moment. Especially when one considers its activity, great numbers, and familiarity with our holdings. This tit is a common species between Perth and Albany, and not uncommon about Kalgoorlie. I should think it filled up the gap between these latter places and Katanning, where I met it in quantity with the assistance of my little guide, Master Robert Adam.

How far north it goes I cannot say, but it extends far into the Eastern area, and appears to be in all well-wooded districts. It is worthy of notice that the *Acanthiza* have not yet been recorded as inhabiting the North-West of the State. It is a sprightly bird, and ever on the move. Prying into crevices and working industriously, it provides its daily bread in the form of insects that seem to serve no direct purpose in our interests when compared with the disadvantage they place with us. September and October are the nesting months, and it is most inadvisable to interfere with the breeding birds in any way. I rather incline to give a hint to our children to take the advice of their parents and let the eggs be. Having done a deal of egg collecting myself, I now find I could have gained much more pleasure in seeing three tiny birds flying with their father and mother. I very much regret that, when I had the opportunity, I did not leave the eggs and all the family playing together in their own merry way. Imagine four youngsters having a day's nesting and coming to a nest containing four eggs about to hatch out four sweet little birds. How would we feel if four Rocs (said to be an extinct bird, enormously large) came down and went off with us? Is it supposed to be worse of a large bird to run off with us, than us to run off with the little ones or their eggs? I have seen little Tom-tits leave an orchard

very much infested with vermin because its eggs were robbed twice. Poor little birds! they were very downcast, and would gladly have remained to do good. I think for their own, and every other's good, boys should tack on the words "birds' eggs" to the Commandment "Thou shalt not steal." Parents might do well to see it applied at least on each Saturday night during August, September, and October.

Nest.—Placed in thick foliage near the ground. Dome-shaped, side entrance; made of dried grasses and lined with feathers. It is wonderful where so many feathers come from, and the birds must scour the district for each other's moulted contour-feathers. Although not so much a labor as with the foreign little bird that places 2,000 in its nest, still it must need a deal of hunting.

Eggs.—Three to five for a sitting; white, with freckles of a reddish chestnut nearly all over, but which form a zone at the larger end. Length, 0.75 in.; breadth, 0.5 in.

PLAIN-COLORED TIT.

Acanthiza inornata, Gld. (*A-han' thi' za in-or-na' ta*).

Akanthis, a linnet; *in*, not; *ornatus*, ornamented.

Acanthiza inornata, Gould, "Birds of Australia," fol., vol. iii., pl. 59. "Key to the Birds of Australia," Hall, p. 25 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 9, 6, 4.

KEY TO THE SPECIES.—Band on tail, subterminal; throat, ashy-white or yellowish white; head like back, except scaly feathers on forehead; no perceptible dusky streaks on throat and breast, which are plain whitish; upper tail coverts dingy olive brown, but not strikingly different from back. Total length 3.5 in.

As the name implies, the present species is plainly colored. This must not detract from its value in our estimation, because it plays its part as an insectivorous bird just as the best of them do.

The distribution is along the Southern coast of the Continent, and especially in the South-West of this State. I have observed it in the rank forests, as well as in the open country, and commend it to every grower's notice, as one of those birds worthy of the best protection. The nesting months are October and November. The low-land natives, according to Gould, speak of it as the *Djo-bul-djo-bul*.

Nest.—Similar to that of preceding species.

Eggs.—Five to a sitting; white. Length, 0.6 in.; breadth, 0.5 in.

YELLOW-RUMPED TIT. (Yellow-tail Tom-Tit.)

Acanthiza chrysorrhoa, Quoy and Gaim. (*A-han' thi' za kris-o-ro' a*).

Acanthiza chrysorrhoa, Gould, "Birds of Australia," fol., vol. iii., pl. 63. "Key to the Birds of Australia," Hall, p. 25 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 9, 7, 6, 5, 4, 3, 2.

KEY TO THE SPECIES.—Base of tail bright yellow, like upper tail coverts; forehead white spotted; dark band on tail, occupying nearly terminal half of feathers; tail quite even; tarsus scutellated; first primary narrow and short, half length of second primary.

The common hedge-row bird of the cultivated areas of Australia is the present species. So affable is its nature that it not only associates with men and hawks, but builds its home against theirs, especially of the latter. In that case it may be described as a semi-detached, two-roomed house, as the tit's nest is often made of two rooms. Each tit that owns a house in an orchard is worth more than its weight in gold, including the young in the weighing. Even if the family is five, the more the merrier. Each bird at 1 oz., and the gold at 80s., would make the demand of, say 20 guineas, a just one, so valuable are the services of this insectivorous genus. On no account whatever, except for strictly scientific purposes, should this bird be killed or driven from a garden. Especially must we consider that as a worthy labourer it demands nothing for its hire, and if it expects anything it is peace. That surely is easily dispensed from the storeroom of our benevolence. Let me give one word of warning: see that your honest sons are made more honest, if that is possible, by the absolute protection of its nest and eggs. In every way encourage the bird to spend its time about your gardens—not necessarily in them, but around them. This little tit, or so-called "yellow-tail," to city people, the most familiar of country birds, is of a small size, and even appears to attract more notice than the Ground Lark or proper Pipit. The chrome-yellow of the upper tail coverts, with apex of each rectrix barred with black, makes this little grey bird a distinctly prominent one. The markings are only noticeable when the birds, finding themselves disturbed on the feeding ground, rise upon wing, and with blended voices alight in the acacia. They quickly return to the grass, and appear to have little fear of man. With the aid of their tiny feet the birds move rapidly along the ground in search of insects.

This one of ten species of a genus peculiar to Australia puts aside its gregarious habit about July, and enters upon the work of nest-building, a structure that is generally placed within 9 feet, or rarely over 12 feet, from the ground. The house is most often one-chambered, dome shaped, and with cup-like cavity fitted above for the use of the non-sitting bird when the shades of night have fallen and the food of this species has retired. Occasionally two chambers will be formed, without an upper cavity, one lined with care, the other not so, and no dependence can be placed upon which will be correctly finished. I believe the cuckoo's action will finally settle the matter, for if the "parasite's" egg be deposited in one cavity before laying of eggs of the rightful owner, the tit will place its eggs in the other, with the result that the cuckoo's egg will not be hatched. In the case where a one-chambered nest has become utilised by the stranger, the tit may cover the introduced egg with a lining of feathers, and so prevent incubation; but this is not generally resorted to, and the strongest chick becomes the sole surviving member of the group. At another time the cuckoo may be "unfortunate" in the deposition of its

egg within the cup-shaped cavity of the nest, after which it will naturally remain unhatched. This is of rare occurrence. One season I observed a double nest built in the whin, both rooms perfect externally, but the lower one with its entrance facing the bush—an unusual position—finished internally. The whole was new, and the upper one contained an egg of the Narrow-billed Bronze Cuckoo, the lower a clutch of the tit. The birds.



NEST OF YELLOW-RUMPED TIT.

appeared to be in excellent plumage, and were probably old enough to remember the disappointment of one or two past seasons, in so much as related to the hardship of rearing an uncongenial bird, as with previous cases, the foreign egg remained unhatched, and this gave the smaller bird an opportunity to rear its young without the stronger opposition of the well known fighting character. Rarely do small birds add a second nest of the same nature. Mr. Romanes has noted this inclination in the common Wren of Europe, and individual cases are elsewhere quoted.

The "Yellow-tailed Tit" of the boys builds its nest not only in hedges, but on the larger branches of various trees, and, as has been previously noted, to the sticks of the lower portion of a crow's or raven's nest, without any interest in the hazel or white irides of their black neighbours.

A case of two clutches of eggs placed in the same nest, and being sat upon by two birds, is quite unusual. The eggs numbered six, and one male bird appeared to feed the sitting ones with insects. That two birds sat upon the eggs was proved by the flight of both from the nest upon approaching it. How this state of matters would have developed I cannot say, as observations were interrupted by the wilful destruction of the nest. The disposition of this species is certainly a friendly one. A young neighbour of mine one evening caught a family of this tit, comprising the parents and three young ones, and transferred them, along with the nest, to a wire-faced box. They were carefully kept and fed for fourteen days, at the conclusion of which they were allowed their freedom. Each evening for three weeks they returned to the box to roost, and doubtless would have continued the custom had not the innocent-looking cat of the house preyed upon the five in the late hours. In further evidence of the good nature of this bird I may say that, having extracted the eggs from one nest, I kept them away for nearly twenty minutes, and then returned two of the three with indented sides, less a cuckoo's egg that was with them. The bird gracefully, though with agitation, returned to its eggs, and I believe brought the young out, according to evidence seen on my return to the nest a few weeks latter. I know it sat upon the eggs for days after the occurrence.

Nest.—Suspended, side-entranced, and bearing a depression on the head, composed of grasses, bark, and spiders' cocoons, the outside being very roughly finished; feather lining within. A further description is given above.

Eggs.—White, sometimes with a few pink spots at one end. Three or four make a sitting. Length 0·67 in.; breadth 0·5 in.

YELLOW-TINTED TREE-TIT.

Smicrornis flavescens, Gld. (*Smi-corn'is fla-ves'ens*.)

Smicros, a variety of *micros*, i.e., small; *ornis*, a bird; *flavescens*, yellowish.

Smicrornis flavescens, Gould, "Birds of Australia," fol., vol. ii., pl. 104. "Key to the Birds of Australia," Hall, p. 14 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 9, 8, 1.

KEY TO THE SPECIES.—Under surface, sulphur-yellow; upper surface, pale olive; lores and eyebrows, whitish. Total length, 2·75 in.; culmen, 0·25 in.; tarsus, 0·5 in.

Western and Northern Australia have one species of *Smicrornis*, and the Eastern portion of our continent the other. This is one of the little feathered creatures that are less than three inches in length, and one of the smallest of the Australian forms.

Like most other tits it associates in shrubby timber, but unlike the majority of them it passes much time in the high branches of tall timber, clinging in all sorts of positions, and making a thorough over-haul in search of scales, "hardwings," or other small things. Its voice is not a strong one. As well as I know, the habitat is a northern one. Certainly its stronghold is much more north than central.

Nest.—Pyriform, suspended, side entranced; made of grasses and cocoons and lined internally with feathers.

WESTERN SHRIKE-TIT. (White-bellied Shrike-Tit).



Falcunculus leucogaster, Gld. (*Fal-kung' lu-lus, lu-ko-gas' ter*).

Falco, a Falcon; *culus*, diminutive; *leukos*, white; *gaster*, belly.

Falcunculus leucogaster, Gould, "Birds of Australia," fol., vol. ii., pl. 80. "Key to the Birds of Australia," Hall, p. 32 (1899).

GEOGRAPHICAL DISTRIBUTION.—Area 9.

KEY TO THE SPECIES.—Crested; lower part of breast abdomen, and flanks white; male has throat black, female has throat green; culmen curved downward throughout its length; nostrils in a coriaceous groove with an imperfect operculum.

The Western and Eastern sides of the Continent are each represented with a species of the genus (composed of two species). Central Australia is visited by the Eastern bird, which is quite distinct from ours because of the yellow under surface.

It is an active and powerful bird, quite acrobatic while amongst its element. It passes the bulk of its time upon the uppermost branches of eucalypti, say 50 ft. high, and keeps in subjection that portion of coleopterous life which is not sought for by most other birds. It checks the fecundity upon the "sky-raking" branches very much as the small tits do upon the peripheral parts of the lowermost branches. One scours the tops of the aged eucalypti, the other the bottoms of the young. The bill of the Shrike-Tit is very strong, by

means of which it is a furious biter.. Such an instrument proves very fatal to that destructive pest the cockchafer beetle. The erected crest and animation of the sprightly bird, as it climbs or clings to the branches of the trees, just suits it. The uncommonness of the species lies more with the nest than its owner. There always is a difficulty in the procuration of it. First you must find it; then you are to secure it.



NEST OF STRIATED TIT.
One-Seventh Natural Size.

Nest.—A truncated sphere, beautifully built of grass; covered with cobweb. It is placed in the three-pronged fork of a slight upward branch on the top of a high gum.

Eggs.—Three or four to a sitting. Polished white, spotted with olive, varying in intensity, more numerous at the larger end.. Length 1 in.; breadth 0·7 in.

If a separator commences to shake on being worked, the cause should at once be determined, as continuing in such circumstances will cause it to get worn soon. Some of the most important causes of shaking are:—1. When the machine is not set on a solid foundation and not perfectly level. 2. Power not applied with perfect regulation and when the flow of milk into the bowl is not regular. 3. Bearings out of order or worn. If a machine runs unsteadily see that oiling has not been omitted. A free-running and good lubricating oil is essential, as the bearings are very liable to get overheated by the friction produced in machines running at a high rate of speed.

WATER IN SALTED BUTTER.

A case of much interest to butter sellers was commenced at the Preston Quarter Sessions last Thursday week, before Mr. W. H. Worsley-Taylor, Q.C., M.P., and other magistrates. It was the appeal of the Peace and Safety Industrial Society, Ltd., of Water, near Newchurch, against the decision of the justices of the Petty Sessional Division of Rosendale, who had convicted them for selling butter which contained 19·30 per cent. of water. Council for the defence said that the quantity of water contained in the butter did not constitute an offence, and in the case of *Bosomworth v. Bridge* it was decided that even a larger quantity of water (he thought 21 per cent.) would not of itself and without further evidence justify a conviction. They, however, took their stand on what the Court above said, namely, that evidence must be given that it was avoidable to have so great a quantity of water in the butter. On that point it appeared that in butters from Denmark, Sweden, and other parts of the world there was no such quantity of water, from which he argued that it was not necessary. The reason why butter coming from Ireland—as this did—contained such a large quantity of water was that it was made with brine, and therefore contained far more water than butter made with dry salt.

Considerable evidence was given for both sides, and the case lasted three days. The Chairman of the Bench, in giving judgment, said the respondents had not produced any evidence which convinced them that Irish butter could be made by using dry salt, and so as not to contain more than 16 per cent. as a safe outside limit. The appellants' witnesses had established the fact that if the alternative process of pickling or brining—that was, using a strong solution of salt water—was adopted, the percentage of water could not be put below 20 per cent. as a safe outside working limit, and consequently if pickling was a right and necessary process, the quantity of 19·30 per cent. present in this case was “unavoidably mixed in the process of preparation.” They were unanimously of opinion that the respondents had failed to prove that the butter sold was not “of the nature, substance, and quality of the article demanded by the purchaser,” or “that the water present was not unavoidably mixed in the process of preparation.” They therefore allowed the appeal, and squashed the conviction.

The Chairman further stated that the attention of the Court had been called to the importance of the issues involved, and they were invited to state their views on those issues, or some of them. The case was avowedly an attempt for the first time to question the system of pickling as against dry salting, with the intention or result, in effect, of bringing about one uniform standard. Both sides agreed on the great desirability of some authoritative standard or standards being fixed. They ventured, therefore, respectfully to say that, having regard to the magnitude of the interests involved to producers and consumers alike in the trade of butter

imported from Ireland, and the fact that there were two distinct classes of butter imported, and that it was desirable to prevent as far as possible confusion between them, it was the unanimous opinion of the Court that the question of fixing a presumptive standard or standards merited the early attention of the Board of Agriculture.—*Farm Field & Fireside.*

THE DAIRY.

FROZEN EGGS AND BUTTER.

A report from H.B.M. Consulate in Chicago states that in Chicago eggs were taken into cold storage at sixpence a dozen last April, the storage cost being a halfpenny, and they are now on the market wholesale at 7½d., and retailed at a shilling to fourteenpence. Every egg is tested before being stored, as a single bad one in a case would spoil the whole lot.

In September 600,000 cases of eggs, each containing thirty dozen, were taken into cold storage at the Chicago stockyards. These amount to over two thousand million of eggs. Besides that, two of the largest packing houses are said to have been laying in the supplies from the West, and have now in their chillrooms another 216,000,000 eggs, which they bought at from fourpence to sixpence a dozen. The whites and yolks of cracked and broken eggs are separately preserved in air-tight tins, and bad ones are preserved in the same way for tanning leather. And besides all this, good eggs are frozen in bulk. They empty them into fifty-pound tin cans, in which they can be stored for any length of time at 30deg. F. When they are wanted they are taken out and thawed. It is believed that America is the only country engaged in the egg-canning industry.

In June alone, one single company shipped 40,000 boxes of frozen poultry to this country and France.

Butter is stored like this in June. It goes into storage at 9½d. a pound, and comes out at 10½d. Among other things, frozen apples seem to be a first rate line to adopt. They are put into storage at 32 deg. in October at two to three shillings a barrel, and in May they come out at nine shillings.

Fresh fish can be cured for as long as you like at from eighteen to twenty degrees. It is usually brought out for sale after it has been kept up from six to eight months.

In ice itself huge profits are made. It costs from half-a-crown to three shillings a ton to manufacture, is sold to the wholesale dealers at eight shillings, and fetches from sixteen shillings to a pound retail. Last year we imported 505,000 tons of it.

Canada is following the lead of the States, and by means of refrigeration she has increased her exports enormously during the last four years. As an example, she exported £360,000 worth of butter in 1896, while last year she got rid of £1,200,000 worth.—*Farm Field & Fireside.*

PIG-KEEPING.

By "AGRED."

FOODS.—The effect of cooking upon foods fed to swine is one of the most vexed questions connected with the industry. It would be profitless to adduce evidence from advocates of feeding raw food and cooked food. There is an abundance of followers of each system, and all have points of practical importance to build from. A middle course, however, is open to those who are not bound by prejudice, and in this middle course may be found a closer approximate to truth than in either of the hard and fast systems. Among other effects, the cooking of foods modifies the form of the albuminoids and carbo-hydrates, which with fats, are the main constituents of feeding stuffs. On albuminoids, the effect is to coagulate and render less digestible the albuminoids: while on carbo-hydrates, cooking has a beneficial effect by rupturing the cellular coating of the starch grains, and thus permitting the digestive juices to operate more freely. From this it would appear that cooking should have a detrimental effect upon such albuminous foods as peas, but on so exclusively a carbo-hydrate food as potatoes, the opposite should be expected. This is precisely what practical feeding confirms. By cooking peas before feeding, their growth-producing power has been found to decrease 25 per cent., while raw potatoes are of little value for fattening, but if cooked, easily head the list of roots for this purpose. Between these extreme cases, are the many foods of variable constitution in which the digestibility of the carbo-hydrates suffer if uncooked, and the albuminoids if cooked.

To state the conclusion in another way, it may be said that over the average of feeding stuffs it is better to feed for growth and frame development with uncooked food, and for purely fattening purposes with cooked food. In the first case, the maximum of growth producing albuminoids is preserved at the expense of carbo-hydrates: in the latter the maximum of fat producers is obtained, and a certain amount of albuminoids is wasted so far as the pig is concerned. There are outside circumstances that may render cooking advisable, as instance to give a better flavor to some foods, while young weanlings in cold weather usually thrive much better on cooked or scalded meals fed warm than on the raw meal.

In the system followed by these papers, namely the production of pork as a means of improving the fertility of the land at a profit, the employment of a considerable amount of purchased foods is necessary. These will of course be concentrated foodstuffs as opposed to bulky foods, which will probably be of home production. Oilcake, pollard, peas, crushed wheat, oats and barley may all be profitably used for pig feeding when prices

permit. Unfortunately the local produce markets are far from stable, and a certain amount of friendly understanding between importers prevents the free play of the laws of supply and demand. The prices of foodstuffs are often inflated above their feeding value, and the margin of profit to the feeder is reduced. Coconut oil-cake, at about £7 per ton is a useful food in conjunction with others. Old pigs, such as brood sows will take it by itself; and mixed with some bulky food, it affords a cheap source of keeping pregnant sows in steady improvement. While suckling, this cake in mixture with meals is valuable. Young growing stock are easily put off this food if it is used to excess, but where it is carefully used and fed in such quantity that they do not sicken of it, it has undoubted value, and the residual manure is of high quality.

Of grains, perhaps crushed wheat at average local prices is the cheapest, but if oats or barley can be procured at even cost per ton, the addition of either or both, in a well crushed state, would reduce the cost and increase the rapidity of growth. Crushed wheat at even cost of pollard will be found the cheaper food for young pigs, while pollard is better for sucking sows than crushed grains.

In peas at anything between 4s. and 4s. 3d. per bushel of 60lb. will be found a very valuable food for young stock, and breeding stock too. Fed alternately with other foods, quick and cheap growth is obtained and the resultant pork is of excellent quality. It is only occasionally peas can be obtained at this value, and it might wisely be the aim of pig-keepers to produce on the farm several acres of this valuable flesh-producing food.

PASTURES.—As previously stated, the most economical way of producing pork, excepting during the severely cold and wet season of the year, is by feeding on concentrated food while the pigs run on good pastures. The crops that may be grown for this purpose are extensive enough to allow wide selection, and only a few can be considered here. For green pastures a mixture is the best, both because the stock depastured will thrive better on a variety of food, and because a greater quantity of stuff per acre will be produced. Oats, wheat, and vetches make an excellent pasture, while on slightly richer soil, barley and peas may be substituted. Rye on poor sandy soils will return more food per acre than any other grain, and if pigs be put into a paddock of this when the ears are half developed they will make good use of their time.

In districts where artificial grasses thrive, the pig-keeper may exercise his fancy in the mixture, and the popular *Paspalum dilatatum* should be tried. Clovers, lucerne, beans, all varieties of the *Brassica* tribe, pumpkins, melons, squashes, roots of all kinds, sorghums and maize can be employed for this purpose. The main object is to keep up a succession, and the peculiarities of each district will determine the mode of procedure. Carrot and parsnip seed may be mixed with other seeds in such places as there

is a chance of these crops developing. They are excellent for the pigs, and when the surface crop is eaten or dried off the pigs will enjoy digging up the roots in their spare time. Jersey and thousand-headed kale form a good stand-by for affording a summer and early winter supply of greenstuff for suckling sows, and a breadth or two should be tried by those who have not done so.

Pie melons should be grown in considerable quantity, as they can readily be stored to provide a bulk food during the difficult late summer and early winter season. Pulped and flavored with pollard or oilcake, they will provide the non-suckling stock with a satisfactory diet.

The Jerusalem artichoke is a plant which bears a reputation in America as a pasture food sufficiently high to encourage local growers to give it a trial. The following extracts from American pig-keepers' remarks on the subject give an idea of the value of the crop: "Forty head of hogs and their pigs can be kept on an acre of artichokes without other food from the time the frost is out of the ground until the first of June, and from September or October until the ground is frozen again . . . Hogs taken from artichoke pastures are free from intestinal worms, constipation, indigestion and fever." "The Jerusalem artichoke forms a large tube (those of over a pound being nothing unusual) is wonderfully productive, very nutritious, and is well liked by hogs even in a raw state . . . The swine have the best of summer food, and they will dig it and cultivate it themselves." "I have raised the Jerusalem artichoke on my place twelve years . . . All kinds of stock, horses, cattle, sheep, hogs, and chickens are fond of them . . . Am feeding them to my milch cows with best results." Artichokes will do well where potatoes do well, the requirements of each being similar, but where potatoes yield one ton, artichokes will yield five.

Rape is another crop grown by many for pasturing purposes, and some excellent gains have been reported from its use. It should be provided with a rich and humus-laden soil if the best results are to be obtained. A little starving is said to be necessary to get stock to commence to eat it, but when once they do, they become very fond of it.

Where pigs are pastured, a roomy cool shed should always be provided, and clean water always be available for them. The exercise pasture pigs get makes them drink more frequently than confined pigs.

The milking record for the Taranaki Coast, or, in fact, for New Zealand, has been put up by a Plains settler and his wife, who without any help, except what could be given by a 20 months old infant, milked 79 cows twice daily. It is a fact, and can be vouched for (says the *Dairymen*) that he delivered on an average 2,000 lb. of milk a day at the factory, and not a penny was spent in wages last year.

THE MORE COMMON INSECT PESTS OF THE FARM AND MARKET GARDEN, &c.

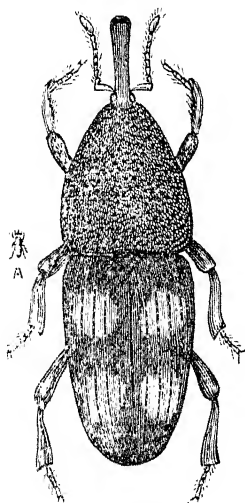
BY ARTHUR M. LEA, F.E.S.

PART II.—INSECTS THAT ATTACK GRAINS AND MEALS.

WEEVILS.

Of all the insects that attack grain the two grain-weevils, *Calandra oryzae* and *C. granaria* are by far the worst. These weevils are similar in habits and size, but differ in colour and a few other details. For all practical purposes, however, they may be regarded as one. The warmer the climate the more rapidly weevils breed, and consequently the greater number of broods there are in a season. It has been estimated that "a single pair will if unchecked produce (among themselves and their descendants) in the course

of a season, 23,600 individuals." The principal damage done is to stored grain, but in tropical and sub-tropical climates, maize is attacked in the field, and in places half the grain destroyed, the cobs on being opened appearing to be full of weevils and dust. At Alstonville on the Richmond River (N.S.W.), one farmer lost more than half the weight of his stored maize in less than a year from the attacks of these insects.



Calandra Oryzae (greatly enlarged.) A. Natural Size.

"Reliable statistics as to actual damage are always difficult to get. The worst attack I find recorded was brought before the meeting of the Entomological Society for April, 1870. It was stated that 10 cwt. of weevils were screened from 74 tons of Spanish wheat, and that in August, 1868, some American maize was stored, weighing 145 tons; in August, 1869, this was found to be infested with weevils, and 6 cwt. of them were screened out; in

December, 29 cwt. more were screened out, making a ton and three quarters in all. We are not told what the maize actually lost in weight, but 35 cwt. of weevils must have consumed something very considerable. This quantity would represent over four thousand millions (4,056,729,600) specimens of the beetle. By actual weighing and counting, I find one ounce contains 530 grains of sound English wheat; or 1,320 grains of weevil-attacked kernels, or 64,680 specimens of *Calandra oryzae*. From these numbers the calculation of damage is not difficult, but it soon becomes plain how soon the attack may become a matter beyond all calculation or remedy."—Fitch.

It is unnecessary here to follow the weevil through the various stages of its life history; it is sufficient to say that the mother weevil deposits only one egg in a grain, and that from then on till the full grown beetle appears its life is passed within that grain. The grain, if of maize, has about half its substance destroyed, if of wheat nearly all the substance is destroyed. The presence of the larvæ may always be detected by whitish irregular lines visible on the outsides of the grain beneath which they have eaten their way. The escape hole of the full grown beetle is always visible. "In the larval stage only one grain is destroyed by each insect, but it is probably more destructive when full grown." The weevils are very long-lived, and are capable of living for several months under absolute starvation.

"It is an absolute necessity that in the case of ground wheat great quantities of the weevil, living as it does in the grain itself, should enter into the composition of the flour. This is unpleasant at least; but it has been conjectured that their presence is injurious, and in other countries disease has even been distinctly traced to the use of flour made from weevily wheat. The following is an analysis of its composition:—An acid analagous to gallic acid; a substance analagous to tannin; some chyline; some phosphate of lime; some phosphate of magnesia; some silica; various sulphates; a peculiar animal matter; some fixed fatty matters; a bitter principle; a resinous matter."—(*Fitch*). It has been proved that one larva of the sugar cane weevil of the Mauritius will give a distinct and disagreeable flavour to several tons of juice, rendering considerable trouble and expense necessary before the taint can be eliminated.

When grain is badly infested, large quantities of dead weevils and the dust which they cause may be seen at the bottom of the bags or heaps, and on a sunshiny day the upper portion of the heaps or the outside of the bags may be seen to be black with the moving insects.

"Bi-sulphide of carbon appears to be the best insecticide to use against grain weevils. The vapour of this substance is poisonous to insect life, and as it is heavier than air it will descend between the kernels of grain, destroying all the weevils which it reaches. Dr. C. V. Riley has called attention to the following method of using it, premising with the statement that one and a half pounds of bi-sulphide is sufficient for each ton of grain. A ball of tow is tied to a stick of such a length that it can reach the middle of the vessel containing the grain. The tow receives the charge of bi-sulphide like a sponge, and is at once plunged into the vessel and left there, the mouth or opening of the vessel then being tightly closed. When necessary, the stick may be withdrawn and the charge (of 1 oz. to 100 pounds of grain) may be renewed. The action of carbon bi-sulphide lasts in ordinary cases six weeks, after which period a fresh charge is required. The bi-sulphide does no

harm to the grain as regards its colour, smell, or cooking properties, and the germinating power of most seeds is not appreciably affected, provided that not too much is used, nor its action continued for too long a period.”—(*Fitch*).

Where it is convenient to do so frequent riddling or turning over of the grain is useful. The warehouses and mills where the grain is stored should have as smooth walls and floors as possible; as in the cracks of walls or floors many insects will remain which it is almost impossible to dislodge. When grain is being stored in bulk, it is advisable to remove any old weevily grain or rubbish which may be left on the floors.

THE LITTLE CORN MOTH.

Grain in many parts of Australia is severely attacked by the little corn moth (*Sitotroga cerealella*). The larva on hatching bores into the grain and when full-fed will have almost completely hollowed it out; when they are full-fed a small round patch of the skin of maize (like a window-pane) is left; a grain so infested is readily seen, and is at once distinctive of the moth as compared with weevils. On becoming a moth it is through this place that the insect obtains its liberty. In the warmer parts of Australia sometimes 30 per cent., or even more, of stored maize is lost by its agency. Wheat is also attacked; one grain, according to Reanmur “contains the exact quantity of nutrition necessary to feed and support the larva until its transformation. In Western Australia the moth is well-known, and when stacks of wheat are being handled it may frequently be seen flying about in large numbers, and it is often (though erroneously so) blamed for an intolerable itching of the arms.

The moth itself is a small greyish insect, measuring about half an inch across the expanded wings; it has a feeble flight and when in stored grain, hops more than flies; it can readily penetrate through grain for some distance. The eggs are laid on the ripening grain in the fields as well as in the barn. There are several broods in a season.

The larvæ are destroyed by several internal, and by at least one external parasite. The latter is a small acarid which, when full grown, is about the size of a poppy seed, perfectly globular (except for the legs and head which, however, are scarcely discernable) and semi-transparent; four to ten specimens attach themselves to a larva, which is soon killed and drained of its juices.

“This is the moth which did so much harm and caused so much alarm in France about the middle of the last century, especially in the province of Angoumois, from which cause it was styled the Angoumois moth.

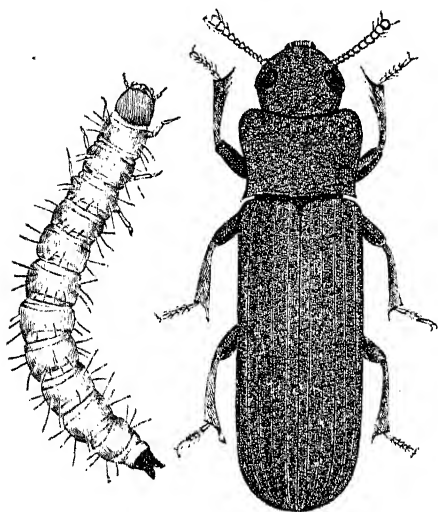
“It has been known in parts of the United States since 1780, and has sometimes caused much injury there to wheat and maize, mainly, however, in the more Southern States, as it seems unable to bear the great cold experienced during the winter in more northern latitudes. In Mississippi it is frequently most destructive;

wheat put into storehouses or granaries in June being sometimes entirely destroyed by September. Maize is also seriously affected in Mississippi, whole cobs, or ears, being completely riddled by its attacks."—(*Journal of the Board of Agriculture, London*). Remedies as for weevils.

THE FLOUR BEETLE.

In this State, next to the weevils, the most injurious insect to stored grains or meals is the flour beetle (*Tribolium ferrugineum*.) This insect is frequently seen in grain, but it is to flour that it is most injurious, and all over Australia it may frequently be seen baked in with bread. In tropical climates it is especially destructive. Experiments carried out some time ago by the Bureau

demonstrated that it was the principal cause of deterioration of flour in the North and North-West. From a seven ounce sample of flour from Derby, 1260 of these insects in various stages were obtained; the sample appeared a living mass and had a strong sickly smell. Bread made from such flour could not fail to be unwholesome, as if even the insects were riddled out of it the excrement they would have passed would remain, and besides altering the taste of the flour cause it to go mouldy much more quickly than it otherwise would.



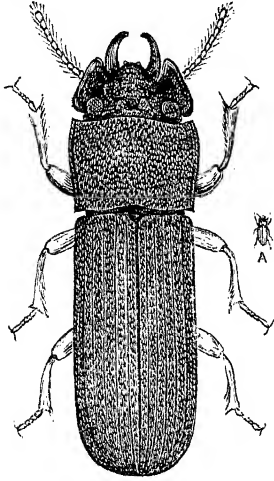
Tribolium ferrugineum and Larva (both greatly enlarged).

Twenty specimens were placed in a closely-fitting box containing one pound of perfectly clean and new flour; one year afterwards, on examining the flour, over 6,000 living beetles and larvæ were counted, besides hundreds of dead ones.

The weight of 20,000 specimens of this insect in all stages is nearly 700 grains. The beetle itself is very small, flat and of a chestnut-brown colour; the larva is narrow, cylindrical and of a yellowish colour. Both may frequently be seen in grains and meals and in almost all dried products such as raisins, almonds, ginger, &c.; they also may be frequently seen under the bark of trees. They do not confine their attacks to vegetable products alone, as they have been frequently seen eating dried insects and other animal substances, such as hides, bird-skins, &c. They are capable of living for several months under absolute starvation.

THE HORNED FLOUR BEETLE.

This is a small beetle belonging to the same family as the preceding, and like that insect is often seen in flour. Its name is



Gnathocerus cornutus. In grain it frequently occurs in thousands, and it is particularly fond of the germinating portion of maize. The male is slightly larger than the female and has the head armed with horns; the female is scarcely to be distinguished from *Tribolium*.

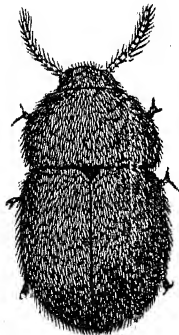
THE SMALL GRAIN BEETLE.

This species (*Silvanus surinameusis*) is a very small, light-brown beetle that may often be seen in grains, meals and other dried products, such as nuts, figs and raisins. It is about one eighth of an inch in length and rather active.

Gnathocerus Cornutus (greatly enlarged).
A. Natural Size.

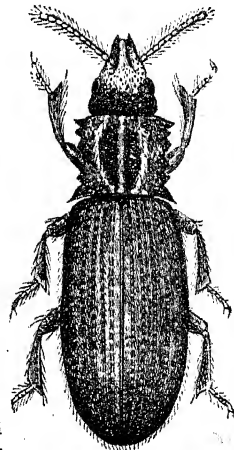
Both adults and larvæ feed on the pupæ and dead bodies of other insects, such as *Tribolium*, *Gnathocerus*, *Ephestia*, &c.; but they cannot be considered useful, as flour and grains are both attacked by them, and they may frequently be seen in figs and raisins unaccompanied by any other insects. The species was originally described as coming from Surinam, but like many other grain pests it is now almost cosmopolitan.

THE TOBACCO BEETLE.



Lasioderma serricorne
(greatly enlarged).

In the tropical and to a certain extent in the sub-tropical portions of Australia, the tobacco beetle (*Lasioderma serricorne*) is very injurious to grains and meals, which it destroys large quantities of. It is a very small, hairy, brown insect, with a curved and very hairy larva. It is very destructive to



Silvanus Surinameusis
(greatly enlarged).

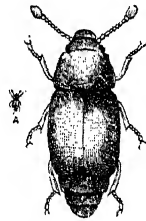
tobacco, both leaf and cigar, and has been recorded as destroying leather. At Champion Bay it may often be seen swarming in rice and wheat. Owing to its destroying large numbers of cigarettes it is sometimes known as the cigarette beetle.

THE MEAL WORM.

The larva and adults of this beetle (*Tenebrio molitor*) may often be seen in flours and meals. The larva is a stiff, yellowish grub, about an inch in length, and in England appears to be a favourite bait with many fishermen. The beetle itself is black, about two-thirds of an inch in length, and is very sluggish in its movements; it may frequently be seen in old buildings, on grain sacks, in stables, &c. In the North-West it is often seen in flour.

A SMALL SHORT-WING BEETLE.

This insect (*Carpophilus dimidiatus*) has been recently seen in maize that had been kept perfectly dry for some time, and in which it absolutely swarmed. It is a well-known insect though not previously recorded from Australia. It appears to feed on the softer parts of grain, and perhaps on those parts rejected by the weevils. In colour it is of a dull-brown, with the short wing-cases (elytra) marked with a lighter colour. The larva is almost white with a pale-yellow head. The species of the family it belongs to (the *Nitidulidae*) nearly all feed on decaying vegetable substances, and are frequently erroneously accused of destroying fruit.



Carpophilus Dimidiatus.
(greatly enlarged).
A. Natural Size.

THE FLOUR OR CHEESE MITE.

This (*Tyroglyphus siro*) is a very minute animal, well-known to attack cheese, but which may often be seen in grains and meals; it has been seen in grain from both Geraldton and Perth. It is seldom seen in clean, new grain, but generally in conjunction with other insects in old grain, and which, were the mites allowed to breed uninterruptedly in it, would soon become a mass of sticky dust.

There are still some farmers who hesitate about breeding the mares that do the common labor on their farms. We think they are acting upon a mistaken idea, unless these mares are required to perform extraordinary arduous service. It is a little inconvenient, probably, for foals to come in ploughing time, but this is not a very serious difficulty. After ploughing time there is usually a season of rest for the working stock on farms, and the grass is at this season growing finely, and the mares have a good opportunity to suckle their foals. Before severe work is again required the foals are strong and hearty, and have a start that will, without mismanagement, carry them well through the year.

AN UP-COUNTRYMAN'S THEORY ON GENERAL STOCK BREEDING.

I will not enter into the actions of sperm cells and germ cells, or gestation, or actual life of the embryo—the theory of generation is too euidite for this article—but simply state the various periods of gestation and incubation, with the variations in individual cases in different kinds of stock. Human beings and cattle furnish the greatest variation, and poultry the least. The periods of gestation and incubation :—

Humankind 265 to 285, with casual variations even then of 10 days over or under that time, the former very seldom. These figures are based from over 900 cases.

The Mare, eleven months with very slight deviations, and those mostly under.

The Ass, about the same.

The Cow, normally nine months. The variations are great, as from a test of 1135 cows made by the French Veterinary College, being from 240 to 321 days, a difference of 81 days.

The Sheep, normally five months, variation 146 to 161 days, or a difference of 15 days.

The Pig, 16 to 17 weeks, with but slight variation of time.

Poultry, the goose 30 days, turkey 26 to 29 days, duck 28 days, Fowls 19 to 21 days, the game bantam nearly invariably 19 days.

Considering the duration of gestation of the mare (some eleven months), one would ascribe the functions of the mare to have far greater influence in casting the type of the progeny than the sire, whose only actions were of but a few minutes' duration. Yet the sire mostly has the greater influence, though, in many instances, the parent who is of the purest blood, of whatsoever kind it be, has the greatest influence on the progeny, and which in most cases the foal will most resemble, or one of their ancestors.

Prepotency in the sire is much to be desired, though in some cases it takes after the dam, and unless that be of a high type, the dam should be discarded as a breeder, and sires should be selected who beget stock after themselves or their family type. By so doing the progeny should be better each generation, and a higher type than the dam.

To explain prepotency, it means that the progeny take more after the sire or dam, to a greater or lesser extent, either in conformation, temperament, constitution or colour.

Some sires have that power to an immense extent. Particularly noticeable in colour, as with some their progeny only run into certain colours, no matter what the dams might be, though occasionally after the dam.

Undoubtedly the most successful sires are those who throw after themselves in most lines, and that embraces all kinds of stock. This is equally as noticeable in Australia as in other parts of the world, more noticeable in some families than in others. For instance, the famous English sire, Touchstone, never begot in his very long stud career but browns, bays and blacks, frequently being called the "three B" horse as it was so marked in his progeny.

The following imported sires were noted for their prepotency.

The Premier, by Toryboy, one of the most successful sires ever brought to Australia, transmitted his quality, docility, wear and tear legs, and splendid hoofs, beautiful head and neck, set on like a game cock's. He was successful with various families, but most with the Rory-O'More's.

The Drummer, by Rataplan, also begot racehorses from all kinds of mares, transmitting the Birdcatcher type both in their good and bad points.

Fisherman, by Heron, was an immense success with the mares owned by the Messrs. Fisher, especially the imported ones, though of different families, but he was a big failure with everybody else, and he had the best in the States sent to him, and he never got a good one but Bagot's Cowra, and she not very high class, never another. Nor did any of the reputed descendants produce anything good, and yet from their mares he begot the highest class of horses and typical of himself. How is this thus? Was it disregarding limitation as far as the mares of the public went?—otherwise it seems unaccountable. Fisherman's progeny from their own mares were of the highest class, and their conformation much like the old horse, to wit Maribrinong. Angler, Fishhook, Ferryman, Little Fish, The Hook, The Swell and most of the fillies were like him in their great height and length, mostly flat sided, and narrow in the chest, and the family has perpetuated the type.

Panic, by Alarm, a great sire for Australia, whose prepotency is clearly showing in his descendants, their adaptability to jump, evidently innate (though unknown in the old fellow) as all of his descendants, even to the third and fourth generation show special proclivities for jumping, their size, strength, wear and tear legs, and their gameness. He got high class stock from all sorts and conditions of mares, even from draughts, all typical Panics, though on coarser lines.

Snowden, by Phyrus the First, unfortunately expatiated too soon, showed great prepotency visible in the quality, courage, and colour he transmitted to his descendants, an immense percentage like himself, greys, and this has been perpetuated by his descendants.

Kelpie, by Weatherbit, was also so, and like himself, a large number of his stock were chestnuts.

Musket, by Toxophilite, perpetuated his great staying powers, courage and immense propellers, noticeable in his get.

Warhawk, by Epirus, perpetuated his peculiar conformation, especially in the low croup, and in his good and bad points. I have known several of his stock from half breed mares do great journeys. I have ridden two of them from Carisbrook to Melbourne within the sun, and back with only one day's spell, some 90 miles. The reason why he was not successful in his latter seasons as in his first—when he begot such high-class stock as Flying Buck, Camden, Falcon, Buzzard, Illumination, Kisteral, Lucy Glitters, Lodden Lass, the great trotting colt Magic, and several others—was want of limitation, as he had for several seasons over a hundred mares, quite enough to ruin the reputation of any horse.

In draught stock it is just as great. Some years ago, Degrave's Mount Wellington prepotency was very marked, he begot a lot of greys, like himself, of immense height, flat sided, narrow chested, and small girthed and visible in many generations seasons, so, perhaps, he did more harm than any other so-styled high-class Clydesdale. Quite different were those high samples of the breed, Black Leg, Prince of Wales, Big Gun, and many others in the early sixties, and whose descendants have been a great boon to the country ever since.

Prepotency on the dam's side is occasionally marked, as in the four thoroughbred mares who produced very high-class stock, viz., Sappho, by Sir Hercules; Ganemead and Fair Helen, by Rory-O'More; and Bertha, by Boyardo, perpetuated the grey very markedly, as their numerous descendants testify: if not greys they are full of grey hairs. The staying power and courage of the breed is very marked.

Still it is better on the sire's side, as that shows the greater number of successes.

The lack of prepotency has also been conspicuous, as shown by the following imported sires, viz., Worcester, The Thames, Indian Warrior, High Sheriff, Mr. Martin, Hawthornden, and many more; also a great number of highly performed colonial bred ones, which also have been "frosts," not begetting stock even equal to their dams, let alone themselves. Was it owing to want of limitation?

Again, some only "hit" when mated to certain strains of blood, to wit, the celebrated mare Pocahontes, invariably begot clippers when mated with sire Birdcatcher, and never with any other strain of blood. Numerous similar instances could be cited. My reason for quoting so many cases of thoroughbred stock is because they are authentic and beyond refutation.

Prepotency is also highly developed in cattle, as in the Short-horn strain of the Oxfords and many others, and in the Ayreshire, the Oakbank, the Jersey—as the Milk-boy strain. In fact in the various breeds prepotency is more or less marked in certain families.

In sheep it is very pronounced, as any one with practical experience must have observed the wonderful influence one particular ram shows more than another, though they may be apparently equal, and perhaps even of the same strain of blood, in begetting stock like themselves. Sir Thomas and the President, and many others were remarkable for their prepotency.

It is the same in pigs, poultry and dogs, probably in everything where any system is carried out, and careful observations made; so sires should be sought for that are notable for throwing stock typical of themselves.

Also the effect of seasons, climate, environment, and even accidents make great difference in the type. The effect of starvation in growing stock is very much in evidence after a drought.

Telegony and saturation (almost similar terms) frequently effect the type. To explain telegony, it is where a mare “throws” continuously after a certain sire that she has been put to, particularly so with the first impregnation. As, for instance, where a mare has been put to a Quaggar or a Zebra, for not only that get shows the marking, but also in some cases in mane and tail as well, and these same are often perpetuated though subsequently served by different sires—in some well-authenticated cases even to the third foal. Undoubtedly impregnation by some horses has a more pronounced influence on some mares, that they perpetuate his type, even where totally different sires have been used subsequently, as before remarked, especially in the first impregnation.

All kinds of breeding must be governed in every case by selection, culling, feed, environment, climate, soil, water and limitation, as these are the factors of success. Having determined for what object you wish to raise the stock. So the particular breed or breeds you must select at the commencement, and adhere to, if a type is to be made and maintained. And that can only be done with brains, determination to stick to the essential previously mentioned for years; also to ensure success many minor matters must be attended to, such as the health of the stock, weaning and subsequent treatment, all factors to success. Where ever possible follow nature as closely as you can, as for instance, with a newly calved cow; milk her little and often, as the calf does for a fortnight, never a deep milking once or twice a day, and you lessen the chance of the dairyman's dreaded drop, as paturent apoplexy or milk fever, as it is generally known by; especially if the cow had been placed on a bit of poor pasture for a fortnight or so, and some mild purgative had been given, such a bran, salt or raw linseed oil, the danger would be minimised.

Colts should be castrated between 12 and 15 months, and at a time when their coats are sleek. This may seem a trifling matter, but I am satisfied from experience that they have a glossier skin under those conditions than if the operation is made when the coat is rough.

If it be the ambition to breed a racehorse, he must select his mares and sires from such families as have proved themselves adapted for that purpose. Family is of more consequence than individual success, so says Stoneheng, and there is no better authority.

If steeplechasing be the aim, look for sires and dams, noticeable for stamina, jumping proclivities, courage and weight-carrying power. As like begets like, or the likeness of some ancestor.

For carriage purposes, the essentials are good looks, action, symmetry, style and soundness of legs and hoofs, these must be sought for. The same applies to other kinds of harness horses without that great height, the present fashion demands for carriage pairs and four-in-hand teams.

For hacks, soundness every way, all round paces, docile-temperament, are the principal desideratum. A big little horse is what is wanted.

(To be continued).

CROSS-BRED SHEEP.

BY ALEX. CRAWFORD.

In South America the breeding of mutton sheep has increased until now about 70 per cent. of the clip that formerly was all Merino, is now long wool or cross-bred, the breeders having gone in more for producing mutton and lamb for export, than for fine wool. With a view of testing the most suitable crosses for breeding fat lambs, the following experiment was carried out lately in Wales: Sixty large-framed ewes with a considerable amount of Leicester blood in them, were selected for the purpose. Divided into four classes they were crossed with the Shropshire, Oxford, Suffolk, and Border Leicester breeds. In the Shropshire cross the lambs were strong and hardy, but only 29 per cent. were ready for the butcher by the end of May. The Oxford cross did not fatten early. The Suffolk cross produced very satisfactory results, 84 per cent. of these were sold before the end of May, and the few that remained afterwards attained considerable weight by the end of the season, and the lambs of this cross were greatly liked by the purchasers. The result of the Border Leicester cross was also good, and, on the whole, the experiment has been so satisfactory that it is being repeated this season with the addition of a Wiltshire Ram.

WOOL.

BY PERCY G. WICKEN.

The sheep-farmer must be guided by the season as to the time to commence shearing. Starting from the most Northern parts of the Federal States to the South of New Zealand, shearing may be said to be going on nearly all the year round. Shearing should be performed before the weather starts to get warm, and care should be taken to keep ahead of the grass seeds, which otherwise get caught in the wool and greatly deteriorates its value.

Shearing should not be carried out too soon after heavy rain, but time should be allowed for the fleece to dry before being shorn. A great many mistakes are made by shearing too early in the season, as if a cold wet change takes place the sheep are not in a position to stand it, and a large number are likely to die from exposure.

In taking off the fleece all second cuts should be avoided. It is better to lose the small piece of wool than to make second cuts which detract from the value of the wool. Care must be taken that the fleece is not broken in shearing. If any cuts are made in the sheep while shearing Stockholm tar is the best remedy to use. It heals the wound and keeps off the flies.

On being removed from the shearing floor the fleece should be kept well together, and spread out on the wool table with the cut end down. The belly part is then removed and thrown into a separate heap along with the skirtings, which are the lower parts of the legs and thighs.

In rolling the fleece the neck and sides are turned in, and the fleece well rolled up and placed in a bin ready for baling. Any black or spotted wool should be packed up by itself. In most large sheds the wool is sorted into first and second combing, and first and second clothing, but before being used by the manufacturer the wool is sorted into a much larger number of classes. The following are some of the terms used in the wool trade.

TECHNICAL TERMS USED IN WOOL TRADE.

Combing Wool.—A distinctive term, applied to the length and soundness of the staple as being suitable for the combing process of manufacturing. Combing wool should be 2in. or more in length.

Clothing.—An equally distinctive term, meaning wool of the shorter growth and in many instances of finer character and quality, which the manufacturers put through a carding machine, it being too short or weak in the staple for combing.

Kindly.—A term often used. Means, as the word expresses, an attractive condition, *i.e.*, as to the get up, with quality more or less combined, but more particularly condition; it means that the

washing has been done well—not overdone—which would render the wool open, loose, or harsh; and that a small yet sufficient rise of yoke has come into the fleece after washing, rendering the wool soft, kindly and attractive to handle.

Fribby.—A term applied to very bitty locks, or to fleeces or scoured wool, where small discolored locky pieces are sometimes intermixed, or where the wool itself generally partakes of this character; also second cuts in shearing.

Dingy.—Applied to scoured and washed wools, signifies not a good color as distinguished from bright and clear.

Moity or Specky.—Terms used when the wool contains small specks and particles of vegetable or other matter often found in the necks and poles of the fleece.

Gruffy.—A slight dust, etc., got by the sheep after washing, and is also applicable to greasy. This character especially applied to many of the Western Australian washed fleece wools.

Earthy and Sandy.—The terms are used when earth or sand is really present in the wool.

Yolky.—Applied to washed wools, means that good condition of the animal which gives softness to the wool, the yolk rising between washing and shearing. The term is also applied to greasy wool when heavy in grease and yolk.

Cotted and Matted.—Terms which mean that the flesh side is matted or fetted together, caused by ill-health of the sheep, bad keep, etc., more prevalent in deep-grown wools when badly maintained.

Stained.—A yellow, and sometimes a greenish hue, caused by illhealth of the sheep and urine stains.

Tender.—When the wool breaks in the centre or any part of the staple. Tenderness may also be caused by ill-health of the sheep, starvation, etc.

Sickly and Hungry.—When the wool is matted, stained, tender, and poorly grown.

Healthy, Useful and Sound.—Apply as the words themselves express when the staple draws out well.

Free and Plump.—Not tender, and will work well in the machinery.

Mushy.—When the fibres of the wool have hardly any hold together, very short in the staple, rotten, loose and mushy. Mostly found on rumps and hollow of the back, generally among old sheep.

Shafty or Lofty.—Terms applied mostly to cross-bred wools, meaning a plump, bulky appearance, or to deep-grown wools generally.

Broken.—When the wool looks torn, will not hold together, is not fleecy. This arises from a variety of causes—poverty, old age, unripeness, or of insufficient growth.

Shirty.—When the wool has the appearance of being grown on the belly or skirts of the fleece. This should be taken off before the fleece is rolled.

Stumpy.—A short staple with broad top: a sign of old sheep's wool.

Kempy.—When there are short, coarse, white or grey hairs grown amongst the fine wool, a sign of badly bred sheep.

Stringy or Roped.—Applied to scoured wool which is much twisted or roped in the scouring.

Loose and Open.—Terms applied generally to ewes and old sheep wools, signifying that the fibres of the staple do not cling together and have not the appearance of young sheep wools.

Heavy.—Signifies that the wool contains much grease or sand.

Hogget or Teg.—Terms applied to the first fleece shorn off a sheep that has not been shorn as a lamb.

Lustre.—A term applied to combing wools with a rich wavy staple of silvery and lustrous appearance, more conspicuous in wools of deeper growth.

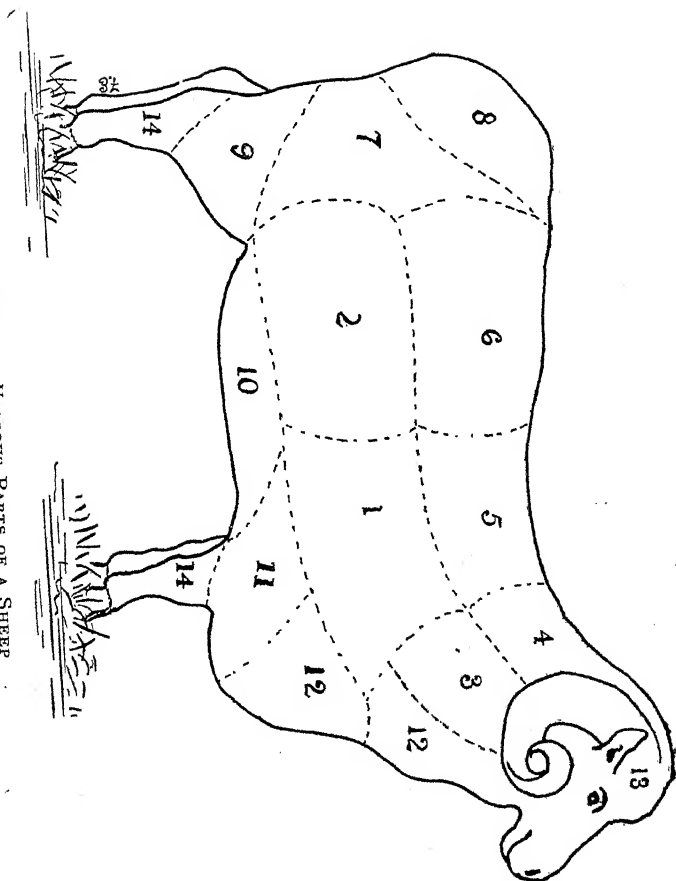
Noity.—Applied to wools that comb badly and waste in the process of manufacture.

Dags.—A term applied to matted or clotted soil and manure found on the britch and sometimes the belly of fleeces.

DESCRIPTION OF WOOL ON VARIOUS PARTS OF A SHEEP.

(See Illustration on opposite page).

- 1 & 2. The finest, longest, and strongest wool.
 - 3 & 12. Short but close.
 4. Rather longer and a shade lower than 3.
 - 5 & 6. Slightly coarser, not so close, and apt to become weak in fibre.
 8. Lower grade still, and termed the "britch."
 7. Good length, but slightly lower in quality than 1 & 2.
 9. Shorter and not so lustrous when compared with better parts.
 10. Short and generally poor in quality.
 11. Shorter than 12.
 13. The cap; dry and harsh.
 14. Fribby and of little value.
- No. 9, 10, 11, 13, & 14, constitute the "skirt."



WOOL ON VARIOUS PARTS OF A SHEEP
(See Page 196).

FIRST NATIONAL SHOW.

In the Queen's Hall, in William-street, on Wednesday afternoon, 6th March (says the *West Australian*) the first National Show of West Australian Produce was opened by the Premier (Mr. Geo. Throssell) in the presence of a large gathering. Among those present were the Minister for Lands (Mr. C. J. Moran), the Minister for Mines (Mr. H. B. Lefroy), the Attorney-General (Mr. Pennefather), the Commissioner for Railways (Mr. B. C. Wood), Messrs. C. E. Dempster, R. S. Haynes, E. McLarty, J. E. Richardson, J. M. Speed, C. A. Piesse, and Burges, M.'sL.C.; and Messrs. W. Kingsmill, J. J. Higham, F. H. Piesse, Lyall Hall, C. Harper, and G. Y. Hubble, M.'sL.A.

Every inch of available floor space in the hall had been made use of for the occasion, and the consequence was that the building possessed the appearance of an exceedingly well-stocked produce establishment, with, however, the very important points of difference that the display was very much larger and the quality of the exhibits infinitely higher than anything which was ever before seen in the colony. Out of the 13 districts into which the agricultural portion of the country has been divided, no less than 12 were represented by exhibits, the sphere of exhibiting bodies extending from Geraldton in the north to Esperance in the south. The twelve districts which forwarded samples of their produce, in order to let the community see what they were capable of, and to allow of a comparison of the relative merits of the various localities, were:—Blackwood, Fremantle, Murray, Esperance, Sussex, Swan, Toodyay, Northam, Victoria, Wellington, Great Southern, and York, Beverley being the only district that was unrepresented. The show was, although its title may be implied otherwise, confined to the products of Western Australia, either in the raw or manufactured state, and thus a comparison with what the other States of the Commonwealth can produce was prohibited. To any person who has seen the various exhibitions of the fruit of the soil in the other States of the group, it would seem almost a pity that the restriction with regard to outside exhibits should have been imposed, for it most certainly appeared that the show, so far, at any rate, as fruit and vegetables were concerned, could more than hold its own with any similar exhibition in Australia. The fruit was of remarkable high quality, grapes and apples holding the most prominent positions. With regard to these two particular lines the Swan district excelled. The grapes were large, and particularly healthy-looking, while the apples were as good as could be desired. The Department of Agriculture offered a Champion prize of £30, with a second prize of £15, and a third prize of £10, for the best collection of exhibits from any particular agricultural district, and this, no doubt, succeeded in providing a deal of competition. The articles to be exhibited were, of course, left to the discretion of the agricultural societies, and the result was that a varied assortment

of exhibits was shown. The York district, which had an excellent and well varied show of items, secured the first prize, the Wellington district coming second, and the Blackwood district third. The champion district, as York can now claim to be, exhibited numerous lines, the principal of which were leather, wool, wheat, and flour, but it appeared to be somewhat weak in the matter of fruit. Its leather exhibits, which came from the tannery of Messrs. McKay Bros., were of a very high order, and they aided very considerably in securing for it the leading prize of the show. The collection had, of course, many other interesting features, but the display of leather was unique, and it undoubtedly gave it a big advantage over less fortunate districts. The Wellington district, which was awarded second prize, was well represented, but its exhibits were not so varied as those of York. Its exhibits of fruit were highly creditable, and the same may be said of those of the Blackwood district, which secured third prize, and those of the Swan district, which might have been placed next. The Swan district was, however, lacking in exhibits of grain, and in these York and Wellington excelled. The other districts, although some of them were very well represented in some lines, did not show as many exhibits nor exhibits of so high a quality as the three districts which secured the coveted places. At the same time it could not be justly said that any district, with the exception, perhaps, of Esperance, made anything approaching a poor display.

The show was for the greater part, in the hands of the agricultural societies, but, nevertheless, several private firms took advantage of the opportunity which was afforded them, and displayed in a very striking manner numerous lines which they had manufactured from articles which were produced in Western Australia. It would be difficult to say which was the most creditable exhibition by the private firms, but it is quite safe to say that those of Messrs. Theo. R. Lowe & Co., Perth; Messrs. W. Sandover & Co., Perth; Messrs. F. & C. Piesse, Katanning; Messrs. W. H. Burford & Sons, Ltd., Victoria Park; Messrs. Silbert & Sharp, Perth; Messrs. Albrecht & Co., East Fremantle; Messrs. Wilson & Johns, Albany Road, Cannington; and Messrs. McKay Bros., of York, were among those which were most worthy of notice. Messrs. Lowe & Co.'s exhibits consisted of a magnificent collection of fruit of all kinds from all parts of the colony, and for it that firm was awarded a gold medal. Messrs. Sandover & Co. showed a very extensive variety of implements for use on every class of farm, and they secured several certificates for their exhibits. In Messrs. F. & C. Piesse's collection the resources of the Katanning district were well represented, while in those of Messrs. H. Albrecht & Co., brush manufacturers, of East Fremantle, striking evidence was given of what this State can do in a direction which until quite recently was never even dreamt of in connection with it. Messrs. Piesse Bros. obtained a silver medal, and Messrs. Albrecht & Co. a bronze medal for their exhibits. A very striking

exhibition was that of Messrs. W. H. Burford & Sons, soap and candle manufacturers, of Victoria Park. This firm displayed every class of soap and candles, all of which were manufactured from articles which were produced in Western Australia, and the lines which were shown certainly appeared to be capable of holding their own with anything which has been imported to the country. Messrs. Wilson & Johns, nurserymen, of Albany Road, Cannington, showed a beautiful lot of pot plants, shrubs and flowers, prominent amongst which were some graceful *Kentia* palms. Messrs. McKay Bros.' exhibits of leather have been referred to above as taking a prominent part in the York district collection.

Special mention must be made of the display for which the Department of Agriculture was directly responsible. This consisted of over 300 exhibits, which had been grown on the Government experimental plots at Drakesbrook and Quindalup, and it afforded an interesting and admirably instructive object lesson to those who are engaged in tilling the soil. In addition to these exhibits, the Department provided about fifty illustrated sketches, which showed in very plain figures the extent of Western Australia's producing powers and the amount of leeway, as represented by the value of the imports, which had yet to be made up.

On all sides were heard tributes of praise to the enterprise of the Agricultural Department for having organised such an exhibition, and to the public spirit of the producers in having responded so well to the call which had been made upon them, thus securing a highly creditable show.

The general arrangements of the show were, of course, in the hands of the Secretary to the Department of Agriculture (Mr. Lindley Cowen), but the main work in the hall was carried out under the supervision of Messrs. P. Wicken and A. Crawford, who deserve the highest praise for the manner in which they acquitted themselves.

The judging was carried out by the following gentlemen:—Produce, Messrs. R. Pell and A. Gorrie; fruit, Messrs. A. Despeissis and Jefferson; edible products, Messrs. F. Cross, E. Wilson and T. R. Lowe; non-edible products, Messrs. W. J. George and W. James; bee and poultry appliances, Mr. A. Crawford; spraying and manures, Mr. W. Patterson; botany, Dr. Morrison; wool, Mr. G. G. Holmes; miscellaneous, Messrs. P. Wicken and A. Crawford.

THE PRIZE LIST.

The following is the prize list:—

Champion District Prize.—York, 1, £30; Wellington, 2, £15; Blackwood, 3, £10.

PRODUCE.

Wheat—W. Downes, Dongarra, 1; W. Linto, York, 2; T. Morrell, Walkaway, 3. Oats—E. R. Beeck, Katanning, 1; J. H. Jupp, Upper Chapman, 2; Dalgety & Co., Wagin, 3. Bar-

ley—J. H. Twine, Toodyay, 1; E. R. Beeck, Katanning, 2; E. R. Breek, Katanning, 3. Rye—J. H. Twine, Toodyay, 1; P. Reilly, Sussex, 2; E. Locke, Lockeville, 3. Oaten Hay—E. Lewington, Beaconsfield, 1; J. Roland, (Narra Tarra), Victoria, 2; C. J. Nairn, (Moora), Toodyay, 3. Wheaten Chaff—F. & C. Piesse, Katanning, 1; A. and H. Society, Esperance, 2; J. Desmond, Walkaway, 3. Peas—J. R. Walter, Blackwood, 1; T. H. Wright, Blackwood, 2; R. M. Brazier, Blackwood, 3. Cow Peas—Whistler Bros., Boyanup, 3. Oaten Chaff—E. Patten, Mooneyoono, 1; E. R. Beeck, Katanning, 2. Wheaten Hay—F. & C. Piesse, 1; Gardner Bros., 2; Lewington, Beaconsfield, 3; D. T. Morrell, Jennapullen, 3. Pumpkins—C. Cook, Dandaragan, Toodyay, 1; A. Carlson, Jandakot, 2; H. Le Steere, Upper Capel, Victoria, 3. Onions—H. Shivers, Wellington, 1; W. J. Pusey, Waigerup, Murray, 2; T. H. Wright, Blackwood, 3. Potatoes—A. A. Muldoon, Brunswick, 1; T. H. Wright, Blackwood, 2; P. Reilly, Sussex, 3. Ensilage—T. R. Walters, Bridgetown, first certificate; J. F. Morrell, Walkaway, second certificate.

FRUIT.

Fruit packed for export—W. L. Brockman, bronze medal; W. L. Brockman, first certificate; H. Doust, first certificate. Apples—collection—Blackwood, bronze medal; Swan, first certificate; E. R. Beeck, second certificate. Dessert Apples—C. Harper, "Dunn's Seedling," first certificate; C. Harper, "White Winter Pearmain," first certificate; Illawarra Orchard, "Jonathan," first certificate; Illawarra Orchard, "Adam's Pearmain," first certificate; K. Edwards, first certificate; W. C. Knight, first certificate; W. J. Eccleston, "Dunn's Seedling," first certificate; W. J. Eccleston, "Ribston Pippin," first certificate; H. T. Doust, "Jonathan," first certificate; H. Doust, first certificate; F. A. Nix, "Peasgood's Nonsuch," first certificate; E. R. Beeck, "Strawberry Pippin," first certificate; E. R. Beeck, "Cox's Orange Pippin," first certificate; G. S. Railway, first certificate; R. E. Warburton, "Cleopatra," first certificate; W. and J. Motram, "Adam's Pearmain," first certificate; R. R. Togue, first certificate; Illawarra Orchard, "Shepherd's Perfection," first certificate; G. Layman, "Stone Pippin," first certificate; N. Abbey, "Maiden's Blush," first certificate.

Pears—Collection—Bronze medal, Swan; first certificate, Blackwood; second certificate, Wellington; first certificate, J. W. Hackett (Bartlett); second certificate, H. Doust; second certificate, J. Alnutt; first certificate, Mrs. Thos. Giblet; second certificate, G.S.R.; second certificate, G.S.R.; first certificate, Illawarra Orchard Co. (Gansel's Bergamont); first certificate, O. E. Owen; first certificate, Coorinja (Bartlett); first certificate, Coorinja; Coorinja Vineyard, first certificate.

Stone Fruits—Collection—Bronze medal, Blackwood; first certificate, C. Harper; second certificate, Wellington.

Peaches.—First certificate, C. Harper (Elberta); first certificate, C. Harper (Lady in Gold); first certificate O. Owen (late Crawford); first certificate, O. Owen (Susquannah); second certificate, K. Edwards; first certificate, R. H. Rose (Elberta); first certificate, B. Needs; first certificate, H. Doust; first certificate, H. Doust; first certificate, P. Zanetti; first certificate, C. J. Lloyd.

Nectarines.—First certificate, Blackwood; first certificate, H. Doust; first certificate, Wellington; first certificate, C. Harper, Victoria, first certificate.

Plums.—First certificate, C. Harper (Kelsey); first certificate, Whistler Bros. (Kelsey); first certificate, J. R. Walter; first certificate, H. Doust; second certificate, E. R. Beeck; W. J. Ecclestone, first certificate.

Apricots.—First certificate, J. R. Walter.

Nuts.—Bronze medal, Blackwood (walnuts); first certificate, W. C. Knight (almonds); first certificate, R. H. Rose (chestnuts); first certificate, E. R. Beeck (almonds).

Grapes.—Collection—Bronze medal, C. Harper; first certificate, Wellington; second certificate Northam; first certificate, C. Harper (Wortley Hall); first certificate, C. Harper (Almeira); first certificate, C. Harper (Centennial); first certificate, J. Wellman (Black St Peter); second certificate, R. H. Rose (Sultana); first certificate, E. M. Clarke.

Wine Grapes.—Second certificate, C. J. Lloyd.

Quinces (collection).—First certificate, Blackwood; second certificate, Swan; second certificate, Wellington. First certificate, Illawarra Orchard Company, "Reis Mammoth;" second certificate, Murray; first certificate, Mrs. J. Bovell.

Citrus Fruits.—First certificate, Swan; second certificate, Murray.

Berries.—First certificate, R. Urch (strawberries); second certificate, F. O. Maitland; second certificate, J. Gibley.

Passion Fruit.—First certificate, Thos. B. Rose.

Rhubarb.—First certificate, D. A. Armstrong; first certificate, (Fremantle), Dixon Bros.; first certificate, W. H. Lang; first certificate, J. W. Hackett.

Persimmons.—First certificate, Murray.

Capsicums.—First certificate, Murray.

Dates.—First certificate, J. H. Twine.

Egg Fruit.—First certificate, Swan; second certificate, W. A. Lang.

Tomatoes.—Bronze medal, Fremantle; first certificate, J. B. Mell and Son.

Bananas.—First certificate, A. Blythe.

MANUFACTURED GOODS.

Best Collection of Edible Articles Manufactured from Produce of West Australian Soil.—E. R. Beeck, Capemont Farm, silver medal; Ross and Co., Fremantle, bronze medal; T. C. Neaves, first-class certificate.

Macaroni.—T. Bertram, R.C. Mission, first certificate.
Olives (Preserved).—T. Bertram, R.C. Mission, first certificate.

Olive Oil.—T. Bertram, R.C. Mission, first certificate.

Bottled Fruits.—A. G. Hamilton, Bunbury, first certificate; Jacoby Bros., Mundaring, second certificate; Mrs. A. Crawford, Guildford, second certificate.

Dried Fruits.—W. H. Mead, Gooseberry Hill, second certificate; E. M. Clarke, Bunbury, third certificate.

Bacon.—C. A. Harvey, York, first certificate, and a special award of a gold medal; E. Smith, Newtown, second certificate.

Jellies.—H. Doust, Bridgetown, first certificate; A. G. Hamilton, Bunbury, second certificate.

Herbs.—Lucy Pries, first certificate.

Jams (Home-made).—T. Hynes, Waterloo, first certificate; Jacoby Bros., Mundaring, second certificate; Lucy Pries, Sussex, third certificate.

Jams (Factory).—Ross and Co., Fremantle, first certificate.

Tomato Sauce (Factory).—Ross and Co., Fremantle, first certificate; T. C. Neaves, West Perth, second certificate.

Pickles (Factory).—T. C. Neaves, West Perth, first certificate.

Tomato Sauce (Factory).—Ross and Co., Fremantle, first certificate.

Tomato Sauce (Home-made).—T. Hynes, Wellington, first certificate; J. R. Walter, Bridgetown, second certificate; F. O. Maitland, Wellington, third certificate.

Pickles (Home-made).—E. Poynton, Sawyer's Valley, first certificate; J. R. Walter, Bridgetown, second certificate; A. Doust, Bridgetown, third certificate.

WINES.

Constantia.—T. Bertram, New Norcia Mission, first certificate; Coorinja Vineyard, Newcastle, second certificate.

Claret.—F. and C. Piesse, Katanning (No. 1), first certificate; F. and C. Piesse, Katanning, (No. 2), second certificate; Jacoby Bros., Mundaring, third certificate.

Shiraz.—E. M. Clark, Bunbury, second certificate.

Reisling.—E. M. Clark, Bunbury, second certificate.

Hock.—E. M. Clark, Bunbury, third certificate.

Chablis.—Mundaring Vineyard Co., first certificate.

Chablis.—F. and C. Piesse, Katanning, special first certificate.

Hermitage.—Coorinja Vineyard, Newcastle, first certificate.

Muscat.—F. and C. Piesse, Katanning, first certificate.

Quinine.—Jacoby Bros., Mundaring, first certificate.

Vermouth.—Jacoby Bros., Mundaring, first certificate.

Vinegar.—J. Partridge, Brunswick, first certificate.

Beer.—Bunbury Brewery Co., first certificate.

Stout.—Bogue's Brewery, Bunbury, first certificate.

PRODUCE.

Butter.—A. G. Layman, Capel, first certificate; J. F. B. Clifton, Australind, second certificate; T. Hayward, jun., Mornington, third certificate.

~~Cheese~~ Cheese.—J. T. Logue, Cookernup, second certificate.

Honey.—W. J. Duffield; Bunbury, first certificate; C. and A. H. Smith, Chidlow's Well, second certificate; Chas. Smith, Newton, third certificate.

Honey in the Comb—C. and A. H. Smith, first certificate.

Flour.—J. S. Byfield, Northam, first certificate; R. Forrest, Bunbury, second certificate; A. Clinch, Victoria, third certificate.

NON-EDIBLE GOODS.

R. McKay, York, gold medal; Burford and Co., Victoria Park, silver medal; Albrecht and Co., Fremantle, bronze medal. Poultry Appliances—Sandover and Co., Perth, bronze medal. Bee Appliances—Sandover and Co., Perth, bronze medal, 1; J. B. Kline, Guildford, first certificate, 2; Spraying Apparatus—Sandover and Co., Perth, bronze medal.

MANURES.

Couche, Calder and Co., bronze medal, 1; Manthorpe and Co., Fremantle, second certificate, 2; Strelitz and Co., Perth, third certificate, 3.

MISCELLANEOUS.

Best collection of Native Grasses—W. H. Mead, Gooseberry Hill, first certificate.

Wool—Withnell Bros., Karratha Station, Roebourne, gold medal; G. H. Rose, Australind, silver medal; Wedge Richardson, Port Hedland, bronze medal.

Floral Exhibit.—Wilson and John, silver medal.

Collection of Machinery.—Sandover and Co., Perth, special certificate.

Exhibit of Soap and Candles.—Burford and Co., Victoria Park, first certificate.

Educational Exhibit of Fruit.—T. R. Lowe and Co., Perth, gold medal.

Collection of Farm Produce.—F. and C. Piesse, Katanning, silver medal.

Special Collection of Farm Products.—E. R. Beeck, Katanning, silver medal.

Display of Beer, Stout, Malt and Barley.—Swan Brewery, Perth, first certificate.

Exhibit of Fruit and Flowers.—J. Hawter, Blackwood and Darling Nurseries, first certificate.

Large Pumpkin.—York W. Waldick, Mount Magnet, second certificate.

Exhibit of Wool.—H. Wills and Co., Fremantle, first certificate.

Exhibit of Wire Work.—J. Goss, Murray Street, Perth, first certificate.

Exhibit of Agricultural Machinery.—R. Purser and Co., William Street, second certificate.

Collection of Flowers.—Mrs. A. Crawford, Guildford, first certificate.

Special Prize offered by Minister of £1 10s. for bag of Sea of Azov Barley.—H. Pascoe, Strawberry.

ARE BEES A NUISANCE ?

That famous bee case of *Utter v. Utter* came up for trial in Orange Co., N.Y., last week, says the *Rural New Yorker*, of December 29th, and the bees won. The Utters appear to be unbrotherly brothers who have long spoken unutterable things of each other. One is a beekeeper and the other a peach grower, who claimed that his brother's bees ruined his peaches. A suit before a justice of the peace resulted in a verdict against the beekeeper. The case was appealed and the National Bee Keeper's Association took it up, and sent a swarm of witnesses to defend the bees. Prof. Frank Benton of the National Agricultural Department was a strong witness. Among other exhibits he had a box containing 19 insects placed side by side. They were much alike in appearance, yet only five of them were bees. When witnesses told how they saw bees eating sound peaches they were asked to pick out the bees in the box. They were badly mixed up, and in most cases picked out insects that were not bees at all! There was little left of the peach grower's case, and the jury brought in a verdict against him in 15 minutes. Now then, let the bee alone!

With reference to the above a somewhat similar case occurred at Guildford the other week, when a resident sent the following letter to the Secretary of the Road Board:—

"I should like to know if it is possible to make a neighbour of mine living on the Bridge Estate, either keep his bees at home or else take them to some other locality, as they (the bees) are a constant source of annoyance to the people living around, and also to horses working in the field, since the warm weather set in, as the bees are travelling to and from the river all day long for water, and when the wind is strong fly low, striking man and horse and often stinging. It is impossible to keep any standing water in tubs or troughs for the horses on account of the numbers of bees that crowd round to drink, and when the horses come they cannot get water for the bees stinging. Yesterday when it was so hot the bees kept coming into my house to a bucket of water. A few hives would be nothing, but there are several hundred swarms."

[Up to going to press we have not heard any more of the matter.—ED.]

ERAGROSTIS BROWNII.

A SUMMER FORAGE GRASS.

By A. MORRISON.

The genus *Eragrostis* (literally translated "Love-grass") is widely distributed in both hemispheres, growing in warm and temperate regions, and contains about 100 species, of which 19 are found in Australia, and nine of these again in this State. Speaking generally, they may be recognised by their long narrow spikelets containing numerous flowers, the flowering glumes being without awns, keeled and three-nerved, while the grain is free from the chaff and not furrowed.

Eragrostis Brownii has flat spikelets half an inch, or less, or more, in length, with the flowering glumes closely overlapping one another in two rows, between which is a slight longitudinal depression. They contain 10 to 40 flowers, the inner scales or *palea* enclosing them being shorter than the glumes, incurved, and their keel mostly minutely ciliate. The grain is ovoid-oblong and smooth, while the leaves are narrow with a few hairs only at the orifice of the sheaths. The arrangement of the spikelets is very variable, so much so that the different forms assumed by this grass would never be thought to be of the same species, if judged by the general appearance alone. The spikelets are usually unstalked, and may be densely clustered along the stem, or on a few distant branches, or, as in the illustration—taken from a drawing of a specimen from the Blackwood River—they may be rather small and arranged singly on stalklets in a slender branching flower-stem. The last is quite an exceptional form, and, as the variety *patens*, has been recorded as a native of New South Wales and Victoria. The species is widely spread in Australia, from the Gulf of Carpentaria to the south of Victoria, and is found also in India. The variety *patens* is found in New South Wales and Victoria, and in Western Australia, as well in the East Kimberley district as at the Blackwood River.

In December last, the Secretary of the Department sent from Mulalup, Blackwood River, a specimen of this grass for identification, as one that was highly spoken of by sheep farmers. In the following January Mr. W. Ralf Barker writing to Mr. Despeissis, mentioned the same grass, of which he forwarded a specimen, with a request for its name. He said, "Mr. C. Brockman some years ago found a few plants at Brooklands, and so impressed was he with its good qualities for summer grazing, that he collected all the seed and planted it on different portions of the run, and now it has spread so well, that when I was there, I drove for three-quarters of a mile through a green flat of this grass. It is called by some Marbelup grass, from the place where it was first noticed (Marbelup is on Wilson's Inlet 25 miles from Albany), and it is thought to have been planted there by an early settler."



ERAGROSTIS BROWNII, var. *patens*.

As the grass is a native of the Blackwood district, there is no need to assume that it was planted there, although as a fact, that may have been done at some particular locality. Its chief merit, perhaps, lies in its hardiness as a summer grass, flourishing during the hottest part of the year, when the ground is baked hard and dry; but at the same time its nutritive value is doubtless high. It may be mentioned that the Teff of Abyssinia is *Eragrostis Abyssinica*, but is thought by some to be a cultivated form of *E. pilosa*, a species widely distributed over the world, and found in this and the other States of Australia. The grain of the Teff forms one of the chief food-materials of the Abyssinians, being converted by them into bread having an agreeable acidulous taste. Other species of *Eragrostis* are cultivated as ornamental grasses, and the flowering stems of the one here illustrated may be deemed worthy to serve that purpose.

ORCHARD AND VINEYARD.

A NOTABLE SHIPMENT OF FRUIT.

Fruitgrowers will be interested in an explanation of the Sutherland process of packing fruit for export, at this juncture, when attention is centred on a shipment about to be made both from Victoria and South Australia, under the process in question, by the steamer Warrigal. The Sutherland process is a most interesting example of solution by a scientific mind of a problem which for years has baffled laymen and practical fruitgrowers anxious to extend the range of their operations in soft fruits. Before Mr. Sutherland designed an environment which should preserve soft fruits successfully, it was necessary for him to take note of the forces marshalled against him. In the first place he observed that nature, in the case of fruit-trees, as in the case of other forms of life, insistent on the reproduction of the species, provided for the safe maturing of the nucleus, and this was accomplished in the case of a pear pip and a peach stone by enveloping it in a fleshy covering. Originally the bulk of this fleshy covering did not bear the same large relation to the size of the seed that we now observe in most edible fruits. Man, by culture from the crab apple, has produced the Cleopatra; and from a very primitive fruit, the luscious peach, for which the wealthy Londoner will pay such fabulous prices. This fleshy covering, it is held by some scientific men, had more than one function. It was first a protecting nursery prison in which the young seed grew to maturity; but, in order that the nursery might not remain a prison, nature planted on the skin myriads of germs, which in the fulness of time, under favourable conditions, would spring into activity and by attacking the prison walls, at last set free the seed. In the second place the fleshy covering was designed so that during the process of decay it might act as a manure to assist in the germination of the seed; and,

thirdly, in some instances it was made palatable either to birds or animals, who, eating it, would become distributors of the seed; for, failing this distribution, the young tree growing beneath the parent foliage would have no chance in the struggle for existence. The next thing that Mr. Sutherland set himself to observe was, what were the conditions favourable to the germination of the spores which nature has set in the skin of the fruit; for he could not hope to say what was a hostile environment (and this was his goal) until he had first ascertained what were the favourable conditions; but, having done this, he would be in a position by a subversion of them to paralyse these myriad instruments of devastation before they could set about the pulling down of the seed prisons. Briefly, he found that heat and moisture were the two influences which started the germs a-growing; and so his work now obviously consisted in warding off the one and the other. As regards heat, it was known that insulation and refrigeration would satisfactorily cope with it, and that the less the heat—in other words, the greater the cold—the more perfect (within bounds) the preservation. But experience has shown that freezing produced changes in the organic structure of the fruit which, when the process of thawing was resorted to, resulted in its speedy spoiling. It was also known by experience that fruit exposed to very low temperatures, though above freezing, suffered from the effects of excessive moisture thrown down by the greater cold; in other words, the greater preservative properties of the greater cold were neutralised by the baneful results produced by the collateral effects of the great cold. The happy thought struck Mr. Sutherland that he would envelope his fruit in a moisture-proof covering. This, he believed, would enable him to reap the preservative advantage gained by a great degree of cold without suffering from its concomitant disadvantages; and so he made what is now known as the Sutherland patent moisture-proof case lining, the key which has unlocked the door to dry cold, the paralyser of spore activity, the environment hostile to germination. Fruit packed in this patent lining can be submitted to a temperature verging on freezing point without harm resulting. Of course, special chambers maintained at a very much lower temperature than is usual in ordinary fruit chambers are necessary where exportation under the Sutherland process is resorted to.

It will now be interesting to enquire a little more in detail how paralysis of the skin spores can be brought about by the aid of the Sutherland bag. We have seen that all fruits carry on their skins the seeds of pulp decay. The bloom on the skin of a grape, although it looks so beautiful, consists very largely of the spores of various ferments, which pass into a seething mass as soon as the must is made; and so it is with all fruit pulps in so far as the process of fermentation is permitted to proceed. Mould is the name popularly given to the minute fungi which grow on vegetable substances, and when placed under a microscope these are seen to consist of a web of threads from which arise a large

number of short stems. Almost all the fungi which cause the decay of the fruit are of this class, and they grow just like plants in the soil if they are kept watered with moisture. Hence has arisen the maxim, which science and practice confirm, that "dryness is the only reliable preventive of mould." In the case of apples a temperature of 45 or even 50 degrees may sufficiently paralyse the germs of the fungi to prevent them from getting their roots through the comparatively thick skin, which is also supplied with a fruit acid to resist their growth. In the case of pears and all other thin-skin fruits, the nearer they can be kept to 32 degrees—the freezing point of water—the better. Fruit submitted to this temperature has a tendency to throw down moisture from the air. The cold also has a drying and shrinking effect on the pulp itself, and this is shown by the fact of the skin shrivelling. When the moisture from the air in the shape of dew settles on the thus shrivelled skin, the mischief begins. The well-watered fungi attack the skin already injured by its first experience, and the fine fruit becomes a mass of decay and corruption. Very different is the effect when the Sutherland damp-proof envelope is used in the case. The sum total of the moisture held in the air inside the case remains exactly the same throughout the voyage to England—the air from the South Australian orchard is, in fact, exported along with the fruit to England. Consequently the fruit is preserved from shrivelling and depositing moisture, which, like the alternative fevers and cold sweats of a patient when dangerously ill, foretell a speedy dissolution. When the Sutherland lining is used the low temperature paralyses the spores, and the want of deposited moisture gives them no chance in their enfeebled condition to germinate; thus the evil of incipient decay is completely check-mated, and in the keen game between the natural forces of putrefaction and man's care and inventive skill, man comes off the winner.

CANNING AND PULPING FRUIT.

In view of the visit of our representative to the fruit districts of Tasmania, we have thought it desirable to give some particulars of the system of canning and pulping fruit for shipment, and do so by reproducing the article written by Mr. Stuart Hogg, orchardist at the Wagga Wagga Experimental Farm, for the *Agricultural Gazette* of New South Wales. Mr. Hogg refers to tins holding 10lbs. to 45lbs. of pulp; but for shipment to England the latter, or casks would be used.

CANNING.

Treating first of canning or the preserving of fruit in glass jars, or any other open-mouthed vessels:

Now, the most essential thing in canning is the fruit, and the condition in which it arrives into the hands of the operator. I wish

to point out right here that if your fruit is *not* ripe, *too* ripe, or bruised, you cannot produce a good sample. The picker of the fruit must be thoroughly conversant with the conditions of canning. This being so, he picks his fruit just when it is firm and sweet, and in such a condition as to bear carriage without bruising. Having placed the fruit in the hands of the operator, he (that is the operator) proceeds to grade it. This is a most important operation, as nothing looks worse than large and small fruit mixed together in the one jar.

THE APRICOT.

Supposing we are handling apricots. Having graded them, we put them in a trough full of clean cold water. Always handle the fruit in water as much as possible; in the first place it cleans the fruit and also prevents bruising. If you have decided to pit (or stone) your fruit (this making a difference in the times for cooking, which I will explain later on; at the same time it is always customary to pit all stoned fruit for commercial purposes with the exception of small plums) having removed the stones, you carefully but firmly pack the fruit in jars, bottles, etc., being careful to press down the fruit without injury to it; the syrup is then poured in, and the fruit is ready for cooking. The question now arises, "How long has it to be cooked?" and this can only be answered by experience, observation and practice, and the condition of the fruit regulates the time of cooking. At the same time, I can give you a very good idea, and quite sufficient to start upon. Place your glass jars in warm water in a boiler fitted with a wooden frame made so that the bottles will stand up without touching each other or the bottom of the vessel; bring it to the boil, being very careful to keep the jars filled to the mouth with syrup. Having taken these precautions, you let them cook from 15 to 20 minutes, according to the condition of the apricots.

THE PEACH.

This fruit requires extreme care in handling, being particularly susceptible to bruises, and must be picked when in a firm condition.

It generally requires peeling, and this should be done after grading. In choosing a canning peach, do not be led away with the idea that a good eating peach will turn out a good canner; in fact, it is invariably the reverse. A good canning peach requires to be tough, firm, and not necessarily of high flavour; you will find that the cooking will develop a flavour in a fruit which previously appeared to possess none. The clingstone peaches are, as a rule, best adapted for canning, but you will find they will take a little longer to cook than the freestones. If you are canning peaches with a scarlet centre, such as the Early Crawford, the Elberta, or the Lady Palmerston, etc., it is always advisable to immerse your fruit in boiling water for about three minutes before packing it in the jars for a final cooking; this, you will find, to a great extent fixes the colour, thereby preventing it from discolouring your syrup.

SYRUP AND HOW TO MAKE IT.

This should always be made from the very best sugar in the proportion of from 20 to 25 per cent. sugar, using rain water. This proportion, of course, varies according to the condition of your fruit. You must be careful, when the latter is ripe, not to make the syrup too sweet, or else you will find that your fruit will split and become ragged. When the syrup is made from cold water it keeps better, but avoid keeping it longer than two days on any occasion. I mean by this, if you are canning a lot of fruit, make fresh syrup every third day.

Having described the rudiments of the process, I will now give you the different times for cooking :

Apricots	...	...	...	15 to 20 minutes
Peaches—Freestone	...	...	...	12 to 15 „
„ Clingstone	...	...	...	18 to 23 „
Plums	...	...	...	12 to 21 „
Pears	...	...	...	12 to 20 „

The foregoing should be peeled and cut into halves or quarters, and the core removed.

Figs 12 to 18 minutes.

The stems should be removed.

Goosberries 9 to 12 minutes.

The stems should be removed and the fruit graded.

Tomato 18 to 20 minutes.

In canning the tomato a little salt is used, this brine being made according to taste; it is advisable not to put too much salt in; use the best salt, and make the water just salty to the taste. To peel the tomatoes, if you so desire, dip them in boiling water for half a minute, and remove the skins.

I have now given you a pretty fair basis to start upon, and you will find that any fruit not actually named in this list will bear comparison with its respective variety.

If the pits are left in the stoned varieties of fruit such as apricots, plums, peaches, &c., allow five minutes longer for cooking.

PULPING.

This is a very simple and efficacious method of preserving fruit for storage or transit, to be converted into jam at some later date. When one considers the thousands of tons of fruit that literally rot and are wasted in these States simply from lack of the adoption of such a simple process as pulping, one is apt to accuse the Australians of being neglectful of their opportunities. If a good class of pulp were placed upon the London market instead of letting your fruit rot upon the ground, it would give you a very remunerative return. Now I am not going into figures; I will leave that to a more mathematical pen and a head better fitted to

statistics to convince you of this fact. All I say is it will pay, and pay well, as some of the more enterprising Australians have shown. The fruit is picked in the same condition as for canning (that is, firm and sweet); at the same time there is no waste, as the over-ripe fruit may be used as well.

All the stoned fruits are pitted and placed in a steam-jacked kettle, a little water added. The whole mass must be constantly stirred, *no sugar being added*. Now the most essential thing in pulping is the cooking. The old theory of cooking merely for the expulsion of the air has exploded, and we find that the pulp must be cooked for such a time as to kill all germs of fermentation.

Immediately the pulp is cooked it is placed in tins and the caps soldered down, care being taken to fill the tins to the brim, the size of the tins generally in use being 10 lb. tins, these being round, and 45 lb. tins being square. If, after the tins have been closed down, any of them exhibit signs of swelling, it is a sure sign of insufficient cooking. The pulp from these must be emptied out and recooked for as long as originally; in fact, a few minutes longer.

It is quite optional as to whether you peel your fruit for pulping or not.

I will now give you a list of the different times for cooking the different fruits for pulping:

Apricots	...	...	boil for about 25 minutes.
Peaches	...	...	" " 30 "
Nectarines	...	...	" " 30 "
Plums	...	...	" " 30 "
Figs ...	...	...	" " 35 "
Cherries	...	...	" " 30 "
Pears, soft	...	...	" " 30 "
" hard	...	...	" " 35 "
Quinces	...	...	" " 35 "
Apples	...	...	from 30 to 35 "
Goosberries	...	...	" 25 to 30 "

This list, of course, does not apply to every condition of the fruit, and you will only become perfect by practice; at the same time, it is sufficiently adequate to start upon.

Now, supposing you were the recipient of a tin of pulp, and you wished to convert it into jam. For every pound of pulp add about $\frac{3}{4}$ lb. of sugar, and boil for about 30 minutes.

Before closing this article—and speaking of jams reminded me of it—well, it is just this, that dried apricots make splendid jam. Take 1 lb. dried apricots; having washed them in clean water—to let the tap run on them is a good plan—place in a round flat dish, say an enamel basin; then cover them with boiling water, and allow to stand twelve hours; to this add $1\frac{1}{4}$ lb. of sugar, and boil for thirty minutes. The result will be $4\frac{1}{2}$ lb. of delicious jam.

GARDEN NOTES FOR MARCH.

BY PERCY G. WICKEN.

Now that the worst of the hot weather is over, a start should be made to clean up the garden, preparatory to sowing fresh seeds as soon as the first of the wet weather sets in. Rake up all the rubbish, pull up all dried up and useless plants and stack together all that are moist, so that they will rot; they will soon decay and will come in later on for manure. If the heap smells offensive it can be covered with a little dry earth, which will soon take away any smell. Every opportunity should now be taken advantage of to prepare the land for future sowing, as when the weather becomes wet, you will not have the same opportunities as you have now. Do not be afraid to go too deep. If trenching can be carried out at least 2 ft. deep, so much the better, but the subsoil need not be brought to the surface. If any drains are to be put in, now is the time, so that they can be filled in again before the rain. If the land is trenched, stable manure should be mixed with the soil, the whole depth broken up, and not merely on the surface, you want to encourage the roots to go down. Keep the cultivators going in the orchard and on fallow land so as to keep the surface well stirred. Harvest carefully and put away to dry any seeds that may be ripe. Dry all melon and pumpkin seeds and be careful not to get the varieties mixed up.

BEANS (FRENCH).—Except in a few of the warmer localities, this crop will be nearly over. In hot parts where there is no danger of frost a few rows may be sown.

BEANS (BROAD).—This vegetable likes a heavy clay loam soil, although it will grow and bear in most soils. It should not be sown before the end of the month and the ground requires to be well broken up, and if poor apply plenty of stable manure. Do not apply nitrogenous manures. Bonedust, superphosphate and potash are the manures which should be used. Sow in rows 3 ft. apart and about 5 inches in the rows.

BET (RED).—A few rows may be sown. Thin out the plants that are coming up from previous sowings.

BORECOLE OR KALE.—This is a plant which some like as a vegetable, and others do not think it worth growing. Seed may be sown the same as cabbages and plants put out. It yields a large amount of green stuff which can be used for the table or for stock.

CABBAGE.—Plenty of plants should be available from the seed beds, and they should be planted out as soon as the ground is moist enough. Plant in rows 3 ft. apart and 2 ft. in the rows.

CARROTS.—Plant out a supply for the winter. The drills should be 18 in. apart. The seed takes some time to come up, and the weeds want looking after.

SWEET POTATOES should now be ready to dig. They can be stored, and if kept in dry sand will keep good throughout the winter.

TOMATOES are getting scarce, destroy by burning or boiling all diseased fruits to prevent the spread of disease.

MELONS AND PUMPKINS.—Store away for future use all those that are sound, they will be useful later on; any dry shed will do to store them in.

PEAS.—In the cooler districts a few rows of peas may be sown. Work the ground well, and apply plenty of potash manures.

TURNIPS.—Prepare as much land as you require for this crop, and as soon as the rain comes sow full crops. There are a great number of varieties to choose from in both white, yellow and Swede varieties.

FARM.—Most of the wheat crop is now winnowed and either sold or stored away until an opportunity offers for disposal at a satisfactory figure. Chaff-cutting is about the principal operation going on at the present time. Every effort should be made to get the chaff cut before the winter, otherwise the stacks will require thatching or covering. The first operation is ploughing for the next crop, where the land is sufficiently soft, the ploughing should be done as soon as possible so as to give the land an opportunity to sweeten before sowing. Where ploughing is not practical the ploughs should be overhauled and the necessary parts for renewal obtained, so as to make an early start when the ground is sufficiently moist. Remember that in most cases it is the early sown crops that give the best returns. Look out the seed drills and give them a clean up ready to start operations when required. Wherever possible a rotation of crops should be carried out or the ground allowed to lie fallow every third, if not every second, season. Crops of Rape, Mustard, etc., may be sown for sheep feed, and Mangels, Turnips or Sugar Beets for feeding stock.

ANSWERS TO CORRESPONDENTS.

Mr. Hugh M. Dallas, Waroona, writes:—"I am sending by to-day's post some apples which have gone wrong. I would be glad if you would let me know what is the matter with them, and what measures to take to prevent a re-occurrence of same. I suppose nothing can be done till the fruit is off. The apples are 'Rome Beauties.' I have 200 trees of them, and the fruit set from the early blossom seem nearly all similarly affected." The matter was referred to Mr. Despeissis, who forwarded samples to the apples to Dr. Cobb, Government Vegetable Pathologist, Melbourne, for his investigation; the following reply was received from Professor D. McAlpin, the Government Pathologist of Victoria:—"The apples sent by you exhibited no signs of any fungus disease. Doubtless they are similar to those referred to by Dr. Cobb, (who described the affection as "an obscure disease"). The symptoms are by no means uncommon, but as yet no satisfactory explanation has been advanced. The tissues simply seem to dry up, often leaving large cavities under the skin. Your mention of the variety 'Rome Beauty,' recalls to my mind that in many districts of this State, this variety does not suffer from 'Bitter Pit' in the same way as the Cleopatra for instance, though the appearance shown in your specimen is sometimes met with. Possibly 'Bitter Pit' and this disease have

a common cause, which cause, in certain varieties, gives rise to 'Bitter Fit,' and in others the larger sunken areas." With a view to making further inquiries, Mr. Despeissis is now writing Dr. Cobb, who has lately returned from a prolonged tour through Europe and America, where he has been making investigations into such matters as this, and in the meantime Mr. Despeissis suggests the application of chemical fertilisers as follows: In the winter give some of the trees a dressing of from 3 to 4lbs. of superphosphate of lime, others 2lbs. of muriate or sulphate of potash, or three times that amount of kainit, others 4 to 5lbs. of superphosphate and potash mixed in equal proportions, while others again receive all the fertilisers mentioned above with the addition of half a pound of sulphate of ammonia. One or two lots of the trees should be left as witnesses. The use of organic manure, such as stable manure, is not advisable.

Mr. J. Wellstead, Bremer Bay, writes:—"Can you inform me why the seedling fig tree will not bear fruit. I have one raised in a tin from preserved figs." In reply, Mr. Despeissis, the Viticultural and Horticultural expert to the Department, states:—"Preserved figs are mostly of the variety known as 'Smyrna.' It is the best fig in cultivation but the geographical area of its cultivation is somewhat restricted. The reason is that although growing luxuriantly wherever introduced, it is generally barren when transplanted from its natural home. In order to be productive, three circumstances must be brought together:—Firstly of course the Smyrna fig, then the Capri fig, and thirdly the Blastophaga wasp, this insect in the Mediterranean region where the Smyrna fig is extensively grown, issues at certain seasons of the year from the Capri variety, and forcing an entrance into the Smyrna fig, which it is apt to confuse for the Capri, fertilizes it. This insect is not known in Australia, and no indigenous substitute, so far as we know, can effect the fertilization on the Smyrna fig, hence its barrenness. The Californian experience was the same as ours is at the present day, until steps were taken to introduce the Capri fig, and with it the Blastophaga wasp, which is now well acclimatized in that country where its propagation is carried on on a horticultural as well as a commercial scale.

Mr. Weidenbach, Cannington, writes:—"Mr. Vaughan, from your Bureau, has made an inspection of my garden *re* the fruit fly. I am pleased to find there is no sign of it this season so far, although last year a month before this time it was showing itself in peaches, figs, etc. I can only account for its disappearance by my efforts in carefully destroying all over-ripe or bad fruit, especially figs, quinces, oranges, lemons, etc., throughout the fruit season, and by working the land thoroughly during the summer, particularly under the trees. By publishing this it may benefit fruit-growers generally in destroying this terrible pest." Commenting on this letter, Mr. Despeissis, the Viticultural and Horticultural Expert, says:—"The attached communication from Mr. Weidenbach is interesting, inasmuch as it shows that an invasion of the fruit fly can be stayed, and even checked, by careful and continuous attention to picking and destroying of maggoty fruit even in an orchard stocked with varieties of fruit coming into maturity at various seasons. Mr. Weidenbach's successful efforts could with profit be emulated by other growers."

MARKET REPORT.

FOR MONTH ENDING MARCH 9.

The West Australian General Produce Company report sales effected for the following articles for the month ending March 9th:—Sales during past month good, supplies of produce very fair, the bulk being imported mostly from the Eastern States. Bacon, previous scarcity still continues, and if anything stocks on spot are shorter than ever, f.o.b. values still firming. Hams, couple consignments of Hutton's arrived end of last week which found ready sale, next lot due here by the Wollowra. Butter, stocks on spot very good,

values as hitherto with the exception of some lots $\frac{3}{4}$ d. per lb. higher, and fully expect prices to advance $\frac{3}{4}$ d. to 1d. per lb. before many days are over; f.o.b. values still very firm and in many instances Melbourne exporters have been unable to execute orders at market rates. Lard, very slow sale. Cheese, selling well, prices firm. Eggs, local fresh, very short supplies with excellent demand. Potatoes, values f.o.b. Melbourne and Tasmania much easier, exporters consider present values reached bottom; locally stocks are very fair. Onions good supplies with values slightly easier. Chaff, consignments arrive regularly, prices no inclination to rise. Bran, quoted 1s. bushel c.i.f. Fremantle cash, stocks locally light. Pollard, continues firm at present, c.i.f. values 11 $\frac{1}{4}$ d., stocks locally also light. Flour, imported, spot value £9 10s.; local, unaltered. Oats, white feed, Tasmanians c.i.f. 2s. 2 $\frac{1}{2}$ d.; New Zealand, 2s. 3d. to 2s. 4d. with no immediate alteration expected. Wheat firming slightly and already importation has begun, showing that the locally grown article is insufficient for the season's requirements. Oil cake, selling regularly at usual rates, and the Singapore pure cocoanut article is preferred. Fruit consignments not so heavy just now and prices likely to firm very soon for good sound well packed lots. Vegetables are more in demand than was the case some time back, and sound fresh lots find good outlet. Poultry, better demand for full grown young roosters, but generally old hens and small chickens are hard to quit. Game, if fresh, ready outlet. Porkers, 50lb. to 60lb. dressed, good outlet.

Farm and Dairy Produce.—Bacon, 10 $\frac{1}{2}$ d. to 11d. per lb. Hams, Hutton's 1s. 1 $\frac{1}{2}$ d. to 1s. 2d. per lb. Butter, bulk, 1s. 2d. to 1s. 2 $\frac{1}{2}$ d. per lb.; tinned, 1s. 4 $\frac{1}{2}$ d. per lb. Lard, in tins, patent lids, 9s. per doz. lb. Cheese, mediums, 8 $\frac{3}{4}$ d. to 9 $\frac{3}{4}$ d. per lb.; loaf, 9d. to 9 $\frac{3}{4}$ d. per lb. Eggs, local, fresh, 2s. to 2s. 3d. per doz. Potatoes, Victorian, £10 to £11 per ton; Tasmanians, £12 10s. per ton; local, new, £14 per ton. Onions, 11s. to 12s. per cwt. Chaff, worth from £4 to £5 per ton, in truck lots. Hay, oaten, worth £4 10s. per ton. Bran, truck lots, £6 7s. 6d. Fremantle, less quantities, £6 10s. to £7 per ton. Pollard, truck lots, £6 12s. 6d. per ton, Fremantle; less quantities, £6 15s. to £7 10s. per ton. Flour, imported, £9 10s. per ton; local, £9 to £9 5s. per ton. Oats, white, Tasmanians, 2s. 10 $\frac{1}{2}$ d. to 3s. 3d. per bushel. Maize, 5s. 6d. to 6s. 6d. per bushel. Wheat, truck lots, 3s. 10d. to 4s. per bushel; less quantities, 4s. 3d. to 4s. 6d. per bushel. Oil cake, Singapore, £7 per ton.

Fruit and Vegetables.—Oranges, Italian, 16s. to 18s. per case. Lemons, Italian, from 8s. 6d., 12s. 6d., 14s. 6d., to 17s. 6d. per case. Passion fruit, worth 7s. 6d. per case. Grapes, various qualities, from 3s. 6d., 5s., 6s. 6d., 8s. to 10s. per case. Figs, worth 4d. per doz. Peaches, worth from 5s. to 12s. per case. Plums, worth from 12s. to 16s. per case. Apples, worth from 12s. 6d. to 22s. 6d. per case. Pears, worth from 15s. to 25s. per case. Quinces, worth from 5s. 6d. to 7s. per case. Melons, water, worth 6s. to 7s. per cwt. Cabbage, from 6s. to 9s. per cwt. Carrots and parsnips, 1s. 6d. to 2s. per doz. bunches. Turnips, white, 1s. 6d. per doz. bunches. Marrows and pumpkins, 6s. to 6s. 6d. per cwt. Rhubarb, worth 1d. to 2d. per lb. Capsicums and chillies, worth 4d. to 6d. per lb. Lettuce, worth 8d. per doz. Spring onions, worth 8d. per doz. bunches. Beetroot, worth 1s. 6d. to 2s. 6d. per doz. bunches. Cucumbers, worth 6d. to 2s. per doz. Tomatoes, worth 3s. to 4s. per case. Celery, 1s. 6d. to 2s. 6d. per doz. heads. Cress, 6d. per doz. bunches. Thyme, marjoram, sage, off stalk, 9lb per lb. Mint, off stalk, 6d per lb.

Poultry.—Fowls, prime young roosters 6s 6d per pair, other sorts from 4s to 5s per pair. Ducks, 5s to 6s per pair. Geese, worth 8s 8d to 12s per pair. Turkeys, gobblers, worth 25s per pair. Game, black ducks, worth 3s 6d to 4s 6d per pair. Teale, worth 2s 6d to 3s per pair. Hardhead, worth 2s 6d to 3s 6d per pair. Bluewing, 2s 6d to 3s per pair. Carcase meat.—Pork, 50lb to 60lb, 6 $\frac{1}{2}$ d per lb.

Sundries.—Bonedust, £7 to £7 10s per ton. Phosphate, £4 10s per ton. Superphosphate, £6 10s per ton. Live Guano, £5 10s. per ton; dead guano, £3 10s per ton. Coarse bacon salt, £3 10s per ton. New corn sacks, 7s. 6d. per doz.; second-hand, 4s 6d per doz. Bran bags, 4s. 7d. per doz.

THE CLIMATE OF WESTERN AUSTRALIA DURING FEBRUARY, 1901.

The principal meteorological feature of this month was a willy willy which visited the N.W. coast on the 7th, and then passed overland to the Great Australian Bight. It is quite possible, even probable, that the storm encountered by the S.S. Australind at the end of last month was identical with this willy willy, and the following information is condensed from a report kindly supplied by Captain Mills:—

"On noon of January 29th, the vessel was in the latitude $11^{\circ}46'$ S., and longitude $109^{\circ}30'$ E., barometer reading 29.73 (corrected and reduced to sea level) and wind S.W., blowing hard. The barometer fell steadily with wind and sea increasing, and the captain was obliged to heave to at 10 p.m. Rain commenced to fall in heavy squalls at 8 a.m. on the 30th, and by the afternoon it was blowing a hurricane from W.S.W., with continuous rain and mountainous sea. Position at noon of the 30th, latitude $12^{\circ}20'$, longitude $111^{\circ}00'$.

"The barometer continued to fall until 10 p.m. on the 30th, when a minimum of 29.36 was reached, the wind having backed to the W., and still blowing with hurrican force. The barometer remained at 29.36 until 3 a.m. on the 31st, after which it commenced to rise and the weather to moderate, the wind settling down to a gale from N.W. At noon on the 31st the ship's position was latitude $12^{\circ}10'$, longitude $110^{\circ}37'$. It will be seen from the above that a violent cyclonic storm passed slightly south of the Australind, travelling in a west or N.S.W. direction, and it therefore might have been expected to recurve and strike the N.W. coast of this State."

On February 5th signs of an approaching disturbance were visible at Cossack, and other stations in the neighborhood, and a telegram was sent to all northern ports warning shipping of an expected storm.

Heavy rain started on the early morning of the 6th, being confined at first principally between Broome and Cossack. Of course, telegraphic communication from stations situated near the centre of the storm became interrupted, but later reports show that it struck the coast at about the intersection of the 20th parallel with the 119th meridian, *i.e.*, between Condon and Port Hedland on the evening of the 7th.

At the former place the barometer reached a minimum of 28.771 (sea level) at 5 p.m. on the 7th, with a hurricane from the N.E., veering later to N.W. At Port Hedland there is no meteorological station, but the barometer on two of the boats fell

to 29.58. The wind there was from the S.E. in the morning, S. at noon and S.W. later, the hurricane being at its height between 6 and 8 p.m., blowing from W.S.W.

The heaviest rain fell at this place, where 356 points were recorded on the morning of the 7th, and 955 next day. These facts were not available until some time after the occurrence as the telegraph lines were down in all directions, but on the morning of the 8th a sufficient number of reports were received to show that the storm was inland at about latitude 22° or 23° . It now travelled rather rapidly in a S.E. direction, being preceded and accompanied by copious rains, and on the morning of the 11th it lay in the neighborhood of Kangaroo Island, S.A.

On the whole, this storm has been the most interesting of its kind yet recorded, especially as Captain Mills' observations apparently locate it travelling in a W.S.W. direction long before it reached our shores.

RAINFALL FROM FEBRUARY 6TH-11TH, 1901.

	6th.	7th.	8th.	9th.	10th.	11th.
TROPICS.						
Broome	50	2	93	—	—	—
La Grange Bay ...	—	20	182	136	—	—
Condon	250	330	310	11	—	—
Pt. Hedland	13	356	955	80	—	—
Cossack	5	302	98	—	—	—
Marble Bar	—	81	—	204	—	—
Nullagine	—	25	—	155	—	—
Onslow	60	—	5	—	—	—
GOLDFIELDS.						
Peak Hill	5	2	221	113	—	—
Nannine	—	—	20	238	—	—
Cue	—	—	55	95	8	—
Mt. Magnet	—	—	2	158	—	—
Mt. Sir Samuel ...	—	—	130	270	—	—
Lawlers	3	—	54	347	—	—
Mt. Leonora	—	—	14	324	—	—
Laverton	—	—	45	205	—	—
Niagara	—	—	15	190	—	—
Menzies	—	—	5	346	16	—
Kurnalpi	—	3	1	150	10	57
Bulong	—	—	—	305	50	110
Kalgoorlie	2	—	—	202	50	—
Coolgardie	7	—	—	187	28	—
Norseman	—	—	—	128	62	—
Borrabin	—	—	—	100	16	7
Southern Cross ...	—	—	—	35	1	—
Balladonia	—	—	—	123	5	—

After the passage of this disturbance the weather remained remarkably cool throughout the goldfields district for the remainder of the month. In fact, after the 6th, there was only one hot day, viz., the 17th, when the thermometer just reached 100° at Coolgardie.

From the 21st to the end of the month, in addition to being phenomenally cool, it was cloudy with occasional showers,

especially on the east and north-eastern portions of the fields. In fact it appeared as if a tropical "low" were slowly travelling down from N.W. to S.E., keeping well inland. This appearance was corroborated by the great heat experienced throughout South Australia, but as far as the barometer readings show there was no sign of such a thing. They indicated a "high" south of our coast line with gradually falling gradients northwards. It must be remembered, however, that there is plenty of room for a large cyclone in the interior between our most eastern stations and the transcontinental line in South Australia.

The general impression prevails that in the neighborhood of Perth this summer has been much cooler than usual. This, by the way, seems to be the usual fallacy towards the end of the summer. Whether people remember the severe heat wave of January, 1896, and expect repetition every year, or whether they miss the discomfort to which so many of the citizens of the other States have been accustomed during their protracted heat waves, the fact remains, that year after year one is almost certain to hear continually the expression, "What a delightfully cool summer we are having." This year the feeling has been remarkably general, and yet the figures show conclusively that this summer has been slightly above the average. In making a comparison the average has been obtained from those years only (14) during which the thermometers were mounted under precisely similar circumstances to the present ones.

MEAN OF THE DAILY MAXIMA AT PERTH.

			Present Summer.			Average.
November	80.8	...	78.5
December	83.6	...	83.0
January	88.6	...	86.9
February	87.8	...	87.2

In the tropics it was as usual extremely hot, the worst district being inland at Nullagine, where a mean maximum of 106.5 for the month was recorded. The highest single reading was 113.8 at Onslow.

On the south coast it was, as usual, refreshingly cool. At Cape Leeuwin the mean maximum was only 74.4, and even this is one degree above the average for previous years, and the highest reading for the month was 85.8.

At Breaksea Island the mean maximum was only 72.0, and the highest for the month, 80.5.

The rainfall was very patchy in the tropics, but on the whole considerably above the average for previous years, especially near the N.W. coast. Throughout the Murchison and Goldfields districts it was unusually heavy, but in the west and south-west districts only a few very light showers fell.

THE CLIMATE OF WESTERN AUSTRALIA DURING FEBRUARY, 1901.

Locality.	Barometer (corrected and reduced to sea level).				Shade Temperature.				Average for Previous Years.				Rainfall.	
	Mean.		High- est.	Low- est.	February 1901.				Mean Max.	Mean Min.	Highest ever re- corded.	Lowest ever re- corded.	Points (100 to inch) in month.	Total points since Jan. 1.
	9 a.m. and 3 p.m.	Age for previ- ous years.			Mean Max.	Mean Min.	Mean of Month.	Highest Max.						
Wyndham	29.745	29.762	29.885	29.591	95.5	79.6	87.6	101.2	72.9	98.7	120.0	64.0	424	956
Derby	732	775	—	—	94.2	78.2	86.2	104.5	72.0	93.0	105.0	68.0	331	835
Broome	747	769	877	556	89.0	77.9	83.4	100.0	73.0	90.7	101.5	67.0	812	1843
Condon	716	772	—	28.771	92.8	—	—	102.0	—	93.3	113.0	—	1028	1103
Cossack	720	778	939	29.382	95.9	78.8	87.4	108.0	74.0	96.8	115.0	64.0	417	419
Onslow	736	802	896	494	95.5	75.8	85.6	113.8	69.0	97.2	123.0	60.0	73	73
Carnarvon	790	809	955	619	88.5	72.4	80.4	104.0	65.3	90.5	114.0	52.0	Nil	Nil
Hamelin Pool	796	790	983	596	97.1	70.6	83.8	112.0	62.2	95.8	111.4	58.0	Nil	Nil
Geraldton	836	898	30.031	788	85.7	65.9	75.8	103.1	57.5	85.4	111.0	51.0	18	18
Hall's Creek	774	—	29.915	582	94.0	76.3	85.2	105.2	71.6	—	—	—	857	1010
Nullagine	704	—	933	478	93.8	74.7	84.2	107.5	67.5	—	—	—	286	702
Peak Hill	750	—	30.014	406	90.7	70.8	80.8	107.0	60.4	—	—	—	336	336
Cue	796	792	0.37	534	93.7	70.2	82.0	109.8	61.8	99.2	113.1	57.0	152	152
Yalgoo	824	803	0.26	524	94.4	69.0	81.7	112.0	56.8	97.0	111.3	56.0	77	77
Lawlers	844	—	141	544	87.4	67.8	77.6	107.0	60.0	—	—	—	445	446
Laverton	870	—	285	671	84.8	66.1	75.4	106.0	60.0	—	—	—	404	404
Menzies	867	868	254	582	85.8	64.6	75.2	106.0	54.0	92.4	111.5	47.8	378	378
Kalgoorlie	925	902	278	574	84.6	62.7	73.6	106.2	51.9	90.3	112.0	48.2	262	280
Coolgardie	908	—	263	569	84.6	61.2	72.9	107.4	51.2	90.6	112.9	47.4	250	256

The figures for previous years have been given whenever there are at least three years' complete records. This number is a very low one upon which to base averages, but otherwise the Goldfields would be excluded.

THE CLIMATE OF WESTERN AUSTRALIA DURING FEBRUARY, 1901.—Continued.

Locality.	Barometer (corrected and reduced to sea level.)				Shade Temperature.				Average for Previous Years.				Rainfall.		
	Mean of 9 a.m. and 3 p.m.	Average for previous years.	High-est.	Low-est.	February 1901.				Mean Max.	Mean Min.	Highest ever recorded.	Lowest ever recorded.	Points (100 to inch) in month.	Total points since Jan. 1.	
					Mean Max.	Mean Min.	Mean of Month.	Highest of Max.							Lowest of Max.
Southern Cross
York	901	884	252	486	88.1	61.4	74.8	107.0	91.8	62.6	110.9	46.6	39	39	
Guildford	925	934	210	630	89.2	59.4	74.3	107.0	90.2	63.1	115.6	45.8	7	8	
Perth Gardens	...	...	...	...	87.2	61.8	75.5	108.8	...	...	...	...	6	9
Perth Observatory	915	954	194	648	87.8	63.6	75.7	104.7	88.6	62.9	113.8	49.0	1	12	
Fremantle	928	929	196	660	84.7	63.7	74.0	103.1	84.6	63.8	106.8	50.1	1	14	
Rottnest	918	942	165	674	81.2	64.8	73.0	98.4	82.7	63.9	106.0	48.5	3	7	
Mandurah	948	922	094	614	78.0	64.6	71.3	97.6	81.7	63.3	109.0	52.0	8	8	
Collie	...	...	...	...	85.3	61.3	73.3	97.9	...	...	...	...	1	6
Bunbury	...	...	...	...	85.4	52.2	68.8	100.5	...	...	...	...	Nil	11
Busselton	956	978	235	674	85.2	57.9	71.6	97.5	81.2	58.9	101.5	42.0	9	34	
Bridgetown	...	...	...	...	82.5	55.7	69.1	95.0	...	...	...	...	6	16
Karridale	...	...	...	...	85.0	49.0	67.0	100.0	...	...	...	...	10	25
Cape Leeuwin	974	993	260	712	76.5	56.8	66.6	91.8	77.4	56.9	105.5	41.1	34	61	
Katanning	953	959	243	603	74.4	62.9	68.6	85.8	73.4	62.5	103.8	54.8	18	49	
Albany	962	948	268	611	84.9	55.0	70.0	103.1	83.8	55.0	109.0	37.9	80	87	
Breaksea	30.024	30.044	326	687	74.8	57.2	66.0	83.5	71.2	58.8	100.3	41.0	30	93	
Esperance	003	...	335	601	72.0	61.8	66.9	80.5	69.6	60.2	81.0	50.0	11	42	
Eyre	29.993	022	334	563	78.9	60.4	69.6	105.2	77.3	60.3	113.0	44.0	189	193	
	950	...	287	540	76.0	61.5	68.8	110.2	...	...	...	...	179	179

The figures for previous years have been given whenever there are at least three years' complete records. This number is a very low one upon which to base averages, but otherwise the Goldfields would be excluded.

THE OBSERVATORY, PERTH, 6th March, 1901.

W. E. COOKE, Government Astronomer.

**RAINFALL for Jan., 1901 (completed as far as possible),
and for Feb., 1901 (principally from Telegraphic Reports).**

STATIONS.	JAN.		FEB.		STATIONS.	JAN.		FEB.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
EAST KIMBERLEY:					N'TH-WEST—Cont.				
Wyndham ..	532	..	424	..	Tambrey ..	90	1	..	..
6-Mile ..	460	6	414	10	Millstream ..	71	1	..	..
Carlton ..	..	..	..	..	Mallina ..	11	1	..	..
Denham ..	310	5	..	..	Whim Creek ..	18	2	897	..
Rosewood Downs ..	..	..	..	..	Cooyapooya ..	Nil	..	..	..
Argyle Downs ..	..	..	..	..	Woodbroke ..	Nil	..	..	..
Lisadell ..	..	..	..	..	Croydon ..	55	1	..	..
Turkey Creek ..	460	13	1296	15	Balla Balla ..	33	2	747	5
Ord River ..	..	..	..	..	Roebourne ..	21	1	341	5
Koojubrin ..	..	..	..	..	Cossack ..	2	1	417	6
Hall's Creek ..	153	..	857	..	Fortescue ..	Nil	..	60	5
Flora Valley ..	..	..	..	..	Mardie ..	..	..	..	..
Ruby Creek ..	323	11	..	..	Mt. Stewart ..	59	2	..	..
Denison Downs..	..	..	..	..	Yarraloola ..	50	2	..	..
WEST KIMBERLEY:					Chinginarra ..	..	..	..	..
Obagama ..	..	..	..	..	Onslow ..	Nil	..	73	4
Derby ..	504	7	331	..	Red Hill ..	196	5	..	..
Yeeda ..	..	..	..	..	Mt. Mortimer ..	87	1	..	..
Liveringa ..	..	..	..	..	Wogoola ..	118	2	..	..
Mt. Anderson ..	..	..	..	..	Nanutarra ..	48	1	..	..
Leopold Downs ..	..	..	..	..	Point Cloates ..	23	1	..	..
Fitzroy Crossing	710	11	998	19	GASCOYNE:				
Quanbun ..	..	..	..	..	Winning Pool ..	80	1	129	2
Nookanbah ..	..	..	..	..	Towara ..	27	2	..	..
Broome ..	1031	9	812	..	Ullawarra ..	Nil	..	..	..
Thangoo ..	..	..	..	..	Woorkadjia ..	24	1	..	..
La Grange Bay..	160	5	1359	17	Bangemall ..	Nil	..	..	..
NORTH-WEST:					Minnie Creek ..	Nil	..	..	..
Wallal ..	152	4	877	13	Yanyareddy ..	17	1	..	..
Coodon ..	75	..	1028	..	Carnarvon ..	Nil	..	Nil	..
DeGrey River ..	22	1	..	..	Cooralya ..	..	..	..	..
Port Hedland ..	Nil	..	1432	..	Clifton Downs ..	20	3	..	..
Boodarie ..	10	1	..	..	Dairy Creek ..	Nil	..	..	..
Yule River ..	..	..	..	..	Dirk Hartog Is..	Nil	..	..	..
Warralong ..	75	7	..	..	Sharks Bay ..	Nil	..	Nil	..
Muccan ..	..	..	..	..	Kararang ..	Nil	..	..	..
Mulgie ..	48	3	..	..	Meedo ..	35	1	..	..
Eel Creek ..	..	..	..	..	Tamala ..	Nil	..	..	..
Coongon ..	..	..	..	..	Wooramel ..	Nil	..	Nil	..
Warrawagine ..	5	1	..	..	Hamelin Pool ..	Nil	..	Nil	..
Bamboo Creek ..	168	5	709	9	Byro ..	Nil	..	..	..
Marble Bar ..	205	4	584	10	Mt. Gould ..	..	..	..	..
Warrawoona ..	132	3	520	8	Peak Hill ..	Nil	..	336	..
Corunna Downs	28	4	..	..	Abbotts ..	Nil	..	301	4
Nullagine ..	416	4	286	..	Belele ..	Nil	..	..	..
Tambourah ..	199	3	590	6	Mileura ..	Nil	..	..	..
Roy Hill ..	13	1	..	..	Manfred ..	Nil	..	Nil	..
Mulga Downs ..	78	2	..	..	Meelya ..	..	..	..	..
					Woogarang ..	Nil	..	..	..

RAINFALL.—Continued.

STATIONS.	JAN.		FEB.		STATIONS.	JAN.		FEB.	
	No. of points. 100 equals 1 in.	No. of wet days.	No. of points. 100 equals 1 in.	No. of wet days.		No. of points. 100 equals 1 in.	No. of wet days.	No. of points. 100 equals 1 in.	No. of wet days.
GASCOYNE—Cont.					S.W. Div.—Cont.				
Billabulong ..	Nil	..	..	..	Belvoir ..	10	1	Nil	..
Wooleane ..	2	1	Nil	..	Guildford ..	3	2	6	3
Meka ..	Nil	..	21	1	Canning Timber	..	..	..	..
Mt. Wittenoom ..	5	1	18	3	Mills ..	Nil	..	..	..
Nannine ..	Nil	..	27	4	Perth Gardens ..	11	2	1	1
Star of the East ..	Nil	..	29	2	„ Observatory ..	13	2	1	1
Tuckanarra ..	Nil	..	23	3	Subiaco ..	22	2	Nil	..
Coodardy ..	3	1	..	..	Claremont ..	8	2	Nil	..
Cue ..	Nil	..	15	3	„ (Richardson) ..	..	..	..	..
Day Dawn ..	Nil	..	14	2	Fremantle ..	4	2	3	2
Lake Austin ..	Nil	..	10	2	Rottne ..	Nil	..	8	3
Lennonville ..	Nil	..	15	3	Rockingham ..	5	1	Nil	..
Mt. Magnet ..	8	1	16	3	Jarrahdale ..	33	2	5	1
Challa ..	Nil	..	..	..	Mandurah ..	5	2	1	1
Youeragabbie ..	Nil	..	6	1	Pinjarrah ..	11	2	Nil	..
Murrum ..	12	2	35	2	Harvey ..	18	2	4	1
Yaloo ..	1	1	7	..	SOUTH-WEST, CENTRAL PART (INLAND):				
Gabyon ..	Nil	..	..	..	Momberkine ..	Nil	..	..	..
Gullewa ..	15	1	Nil	..	Culham ..	2	1	25	4
SOUTH-WEST DIVISION (N'N PART):					Newcastle ..	Nil	..	Nil	..
Mt. View ..	Nil	..	8	3	Eumalga ..	5	2	..	..
Yuin ..	..	..	..	..	Northam ..	Nil	..	5	2
Northampton ..	Nil	..	5	2	Grass Valley ..	Nil	..	..	..
Mt. Erin ..	Nil	..	36	3	Meckering ..	4	1	14	3
Oakabella ..	..	..	..	..	Doongin ..	10	1	11	1
Narra Tarra ..	..	..	..	..	Sunset Hill ..	Nil	..	27	2
Tibradden ..	Nil	..	6	3	Cobham ..	Nil	..	17	3
Sand Springs ..	..	..	..	..	York ..	1	1	7	4
Mullewa ..	60	1	Nil	..	Beverley ..	Nil	..	Nil	..
Geraldton ..	Nil	..	18	..	Barrington ..	Nil	..	21	2
Greenough ..	Nil	..	3	1	Sunning Hill ..	Nil	..	..	..
Dongara ..	1	1	6	1	Wandering ..	12	2	2	1
Dongara (Pearse) ..	Nil	..	6	1	Pingelly ..	5	2	15	1
Strawberry ..	Nil	..	Nil	..	Marradong ..	15	2	1	1
Mingine ..	Nil	..	17	3	Bannister ..	5	2	7	1
Rothsay ..	..	..	..	..	Narrogin ..	3	1	70	2
Field's Find ..	Nil	..	..	..	Wickepin ..	Nil	..	..	..
Carnamah ..	Nil	..	19	2	SOUTH-WEST DIVISION (S'N PART):				
Watheroo ..	Nil	..	7	1	Bunbury ..	25	4	9	..
Dandaragan ..	4	1	44	4	Collie ..	11	4	Nil	..
Moora ..	35	1	6	2	Salvation Army	..	..	..	..
Yatheroo ..	9	1	23	2	Settlement ..	13	2	1	1
Walebing ..	1	1	5	1	Glen Mervyn ..	24	3	13	3
New Norcia ..	5	1	18	1	Dardanup ..	36	3	Nil	..
SOUTH-WEST DIVISION, CENTRAL (COASTAL):					Donnybrook ..	11	2	4	2
Gingin ..	15	2	11	3	Boyanup ..	5	2	3	1

RAINFALL.—Continued.

STATIONS.	JAN.		FEB.		STATIONS.	JAN.		FEB.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
SOUTH-WEST—Cont.					EASTERN DIVISION.				
Busselton ..	10	5	6	4	—Continued.				
Quindalup ..	6	3	4	3	Mt. Malcolm ..	12	...	313	2
Margaret River ..	28	1	30	1	Mt. Morgans ..	Nil	...	385	5
Lower Blackwood ..	5	1	19	2	Laverton ..	Nil	...	404	8
Karridale ..	27	8	34	3	Murrin Murrin ..	Nil	...	262	6
Augusta ..	28	5	27	3	The Granites ..	12	1	250	2
Cape Leeuwin ..	31	13	18	5	Tampa ..	4	1	269	3
Riddellia ..	60	1	41	3	Niagara ..	31	2	228	4
The Warren ..	60	6	...	...	Yerilla ..	10	2	324	6
Lake Muir ..	30	6	23	4	Edjudina ..	Nil	...	...	...
Mordalup ..	28	6	17	5	Menzies ..	Nil	...	378	5
Deeside ..	...	...	50	3	Mulline ..	...	...	234	5
Riverside ..	43	6	56	5	Goongarrie ..	Nil	...	375	6
Balbarup ..	44	4	45	4	Kurawa ..	4	2	312	3
Wilgerup ..	38	2	...	...	Dixie Gold Mine ..	7	2	221	7
Mandalup ..	15	2	...	...	Kurnalpi ..	53	3	272	6
Bridgetown ..	15	3	10	3	Bulong ..	23	1	473	6
Greenbushes ..	24	4	16	2	Kanowna ..	Nil	...	220	6
Williams ..	5	1	Nil	...	Kalgoorlie ..	18	1	262	4
Arthur ..	4	2	Nil	...	Coolgardie ..	6	1	250	5
Darkan ..	7	1	...	...	Burbanks ..	6	2	157	4
Wagin ..	4	2	180	2	Londonderry ..	9	1	176	3
Glencove ..	5	2	31	2	Woolubar ..	44	2	248	6
Dyiliabing ..	10	2	21	1	Widgiemooltha ..	15	3	210	2
Katanning ..	7	1	80	1	50-Mile Tank ..	Nil	...	255	3
Kojonup ..	16	1	Nil	...	Norseman ..	25	1	195	3
Broomehill ..	5	2	8	1	Bulla Bulling ..	Nil	...	138	...
Sunnyside ..	11	2	8	1	Woolgangie ..	...	...	133	3
Woodyarrup ..	9	2	9	2	Boorabbin ..	Nil	...	123	3
Cranbrook ..	15	1	10	1	Karalee ..	Nil	...	...	...
Blackwattle ..	30	1	...	...	Yellowdine ..	Nil	...	77	2
Mt. Barker ..	36	4	16	4	Southern Cross ..	Nil	...	39	...
Kendenup ..	25	2	13	2	Mount Jackson ..	Nil	...	82	4
Forest Hill ..	47	6	...	...	Burracoppin ..	Nil	...	45	2
Denmark ..	71	7	43	3	Kellerberrin ..	Nil	...	47	3
Albany ..	63	8	30	3	EUCLA DIVISION :				
Point King ..	58	5	16	2	Coconarup ..	3	1	...	...
Breaksea ..	31	5	11	3	Fanny's Cove ..	5	1	...	...
Cape Riche ..	...	...	...	...	Park Farm ..	5	1	...	...
Pallinup ..	13	2	...	...	Esperance ..	4	3	189	...
Bremer Bay ..	15	1	15	2	Gibson's Soak ..	3	1	...	...
Jarramongup ..	7	2	...	...	30-Mile Condenser ..	Nil	...	...	...
EASTERN DIVISION :					Swan Lagoon ..	2	1	...	...
Lake Way ..	1	1	486	10	Grass Patch ..	1	1	...	...
Mt. Sir Samuel ..	Nil	...	462	...	Israelite Bay ..	14	1	325	4
Lawlers ..	1	1	445	12	Frazer Range ..	18	1	...	...
Diorite King ..	21	2	279	5	Balladonia ..	Nil	...	207	3
Sturt Meadows ..	...	...	...	...	Eyre ..	Nil	...	179	...
Mt. Leonora ..	16	2	359	3	Eucla ..	1	1	120	7

*The Observatory, Perth, March 1901.

W. E. COOKE, Govt. Astronomer.

RETURN OF FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING FEBRUARY, 1901.

NAME OF PORT	No. of Ships.	No. of Consign- ments Inspected.	Total No. of Cases.	No. of Cases Passed.	No. of Cases Prohibited.	No. of Cases Destroyed.	No. of Cases in Quarantine.	No. of Cases Dipped.	No. of Cases of															
									Apricots.	Bananas.	Cherries.	Gooseberries.	Grapes.	Lemons.	Nectarines.	Oranges.	Passion Fruit.	Peaches.	Plums.	Rhubarb.	Strawberries.	Pomoloes.	Pines.	All other fruits.
FREEMANTLE	3	22	2019	2019	..	..	3	2014	..	10	..	..	..	1246	..	584	32	..	1047	..	..	..	..	..
ALBANY	2	2	26	23	3	..	..	26	..	..	..	..	..	..	..	..	..	..	23	..	..	..	..	..
GERALDTON .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMELIN .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSETTON .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE	2	2	19	10	..	..	..	19	2	..	10	..	..	3	..	1	..	..	3	..	..	..	..	..
TOTAL	7	26	2005	2061	3	..	3	2059	2	10	10	..	..	1249	..	585	32	..	1073	..	..	..	..	..

DEPARTMENT OF AGRICULTURE,
8th March, 1901.

RETURN OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING

FEBRUARY, 1901.

NAME OF PORT.	No. of Ships.	No. of Consign- ments of Trees or Plants.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments Passed.	Total No. of Trees or Plants in such Consignments.	No of Consign- ments of Trees or Plants Prohibited.	Total No. of Trees or Plants in such Consignments.	No. of Packages Dipped.	No. of Trees.																
									Ornamental & Pot Plants.	Almonds.	Apples.	Apricots.	Cherries.	Figs.	Lemons.	Limes.	Mulberries.	Oranges.	Peaches.	Pears.	Plums.	Small Fruits.	Vine Cuttings.	All Other Trees	
FREMANTLE ..	2	75	5520	75	5520	..	5520	101	5520	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ALBANY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
GERALDTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMELIN ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSELTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL ..	2	75	5520	75	5520	..	5520	101	5520	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

DEPARTMENT OF AGRICULTURE,

8th March, 1901.

NOTES.

CURIOUS TRAIT IN BEES.—Bees dislike black or dark-coloured clothing. Formerly I used to go about in shirt-sleeves, wearing a dark vest. My vest would be covered with adhering bees, while my sleeves would be entirely free from them. I took the hint and had a white coat made for the purpose of working among the bees, and now rarely is there one to be seen on my person.

DWARFING PLANTS.—A curious way of dwarfing plants for table decoration, says an exchange, is to take an orange, and, having cut a small hole in the peel, to remove all pulp and juice, fill the skin thus emptied with some cocoanut fibre, fine moss, and charcoal, just stiffened with a little loam. In the centre of this put an acorn, date stone, or the kernel of any tree that it is proposed to obtain a dwarf from. Place the orange peel in a tumbler or vase in a window, and moisten the contents occasionally with a little water through the hole in the peel, and sprinkle the surface with fine wood ashes. In due time the tree will push up its stem through the compost, and its roots through the orange peel. The roots must then be cut flush with the peel, and the process repeated frequently for some time. The stem of the tree will assume a stunted, gnarled appearance, making it look like an old tree. When the ends of the roots are cut for the last time, the orange peel, which, curiously enough, does not rot, may be painted black and varnished. Has anyone given this a trial? It is worth trying.

MEXICAN SHEEP.—The old Mexico sheep, writes Professor W. W. Cook, are the direct descendants of the original Spanish Merinoes, brought over 200 years ago by the Spaniards to Old Mexico. They have been bred with scarcely any out-cross, and are very distinctly marked. They have long legs; a long, thin body; not very deep; small, rather long neck, and a long thin head, carried high. The wool is fine and thin. To the eye they appear almost worthless as mutton sheep, and of still less value for wool. Their good points are, they are hardy, excellent travellers, will keep in good condition on the poorest and driest of ranges, are fairly prolific, and can be herded in bunches of almost any size. They fatten easily, though never looking plump and fat like the northern sheep. When they reach the Chicago market, if in good condition, they outsell all other sheep, for they shrink very little in dressing, the meat has an excellent flavour, and the hide is so thin, firm, and soft, as to command the highest price. A well-fatted bunch of Mexican lambs will weigh, on the Chicago market, from 78 lb. to 81 lb. Yearlings, ewes, and old wethers of this breed are in good condition if they weigh 90 lb. in Chicago.

WHERE TO PLACE A THERMOMETER.—Some months ago a question was asked in the Press with reference to the most approved way of placing a thermometer for getting reliable readings, and if we remember aright, it was given as the opinion of an expert that the nature of the shade provided was not of consequence. We should like to state that we have found an appreciable difference between the readings under a Calicut-tiled roof and one covered with the old-fashioned half-round tiles, and we have no doubt that there will be a difference where the roof is of galvanised iron and again of olas. It would, therefore, be as well that there should be a uniformity of conditions, particularly in the tropics, as regards the conditions under which thermometers are kept.

HOW TO FIGHT BUSH FIRES.—Water-carts, with sprays attached, have proved most useful this year in fighting bush fires in Western Victoria, says the *Pastoralists' Review*. The use of telephones is also fast on the increase. These, together with fire-breaks, may be termed the three main lines of defence against bush fires, to which it is highly desirable that a fourth should be added before next season in the shape of fire brigades from the young men in the neighbouring townships. On most stations in the country most subject to fires, the station hands are already organised, so that every man knows what to do and how to do it when a fire breaks out. Very valuable help at times might be rendered if the assistance available in the neighbouring townships was similarly organised. Organisation for co-operative action between neighbouring stations has greatly improved of late, but after this year's experience breaks will be made wider.

THE WOOL MARKET.—The opening of the March series of the London wool sales has been looked forward to with less interest than usual, because previous indications, both in the Australian markets and at Antwerp, pointed pretty plainly to what was likely to happen. The anticipated weakness in inferior Merinos and all but the best crossbreeds is declared to amount to a 5 to 7½ per cent. reduction, and the tone of the market generally is far from strong, the Continental demand still being weak, and the American buyers absent. It would be easy to fill in this brief description of the market with details gathered from the previous sales, but it is obvious that there is no real change in the position, that the market remains weak, with a cautious demand for good well-conditioned wools; and fighting shy of the coarser qualities, or any wool in which holes can be picked. Nor can we see any hope of improvement in the near future. It will take time for the market to regain financial strength, and for the cheapness of wool to make itself felt against cotton and other inferior materials.—*Pastoralists' Review*.

HOW TO GET A GOOD MILKER.—If you want a good milker, make her, and begin to make her the day she is weaned. If you want to keep a good milking machine in good order when you have made it, take as much care of it, and look at it as often as you do at your watch, and keep it even more regularly wound up. You must keep time with your milch cow if you want her to keep time with you. Supply her with properly-balanced rations, if you want a good ration of really valuable milk. Dispense with any cow that does not prove a good milker after her third calf, but remember, the fault is usually altogether the owner's, not the cow.

BREEDING FOR BULLS OR HEIFERS.—I have been trying for six years respecting the selection of sexes, and have been more than fortunate. I started with one cow Ayrshire—first calf, heifer, then bred with shorthorn bull in good condition, result heifer. I have gone on this tack until last year, and have had 10 heifers born in succession. Last year, to continue my experiments, I kept two of the cows in poor condition, bull also for months was in poor condition, result, two bull calves in succession. I shall now go back to trying for heifers again, but my next two should also be bulls according to my theory. I think I shall try and have calves bull and heifer alternately.

THE USE OF SORGHUMS.—The use of the sorghums as forage plants is rapidly increasing in all countries which are semi-arid or subject to frequent long summer droughts. As the use of the plant increases there is an increasing desire to use it as pasture, but there is a reluctance to do so from the fact, that there has sometimes been a loss of stock fed upon the growing plant which could not be accounted for upon the theory that death was caused by ordinary bloat. While these cases have been rare, yet they have occurred, and the cause is not yet known. The Nebraska Experiment Station has been thorough in its investigations, but so far has learned nothing. Samples of sorghums which had killed a cow within a few minutes after eating it, disclosed no trace of any poisonous substance when analysed a few days later. The station authorities are forced to conclude that sorghum sometimes, when growing or freshly cut, contains poison which soon disappears in the process of curing, so that by the time the samples reach the laboratory and are analysed they are harmless. There is at any rate no danger in feeding cured sorghum, and a great deal of sorghum is pastured with no injurious results, and yet the fact that deaths, not from bloat, have sometimes occurred from its use, makes it an undesirable pasture crop until we know more about it. It is suggested by the station authorities that in cases where poisonous effects followed its use, the plant itself was probably unhealthy and yellow, but there are not sufficient data on that point to justify a very strong opinion.—*Weekly Chronicle*.

THE CULTIVATION OF THE AUSTRALIAN NUT.

Macadamia ternifolia.

On the recommendation of Mr. P. Wicken, the Secretary of the Department of Agriculture has caused a small quantity of the nuts of this valuable tree to be imported from Queensland. It is a very prolific bearing and handsome tree, and the nuts when broken are of a most delicate flavor, and equal to any kind of nuts that are sold for eating. The tree will grow almost anywhere where there is no frost, and should thrive well in the north-western parts of the State, and as the nuts are of good keeping quality, owing to their hard shell, they could be shipped to all parts with perfect safety. A small number of the nuts are now available for distribution on application to the Department of Agriculture.

The following notes on the cultivation of this tree were written by Mr. Fred Turner, and published in the New South Wales *Agricultural Gazette* some time ago:—

The "Australian nut," or, as it is frequently called, the "Queensland nut," is a very ornamental evergreen tree.

In its natural state it is mostly found growing on rich alluvial soils bordering rivers or creeks in the coastal districts of southern Queensland, and in the north-eastern portion of New South Wales. Some years ago I saw the tree growing fairly plentifully in Southern Queensland. At that time it was protected on Crown lands by Government regulations, issued to licensed timber-getters. In its native habitat it attains sometimes a height of 50 ft. with a clean, straight trunk for a considerable height. Rarely, however, does it exceed much more than a foot in diameter. When the tree is brought under cultivation, and is allowed plenty of room to grow, not only will the trunk be furnished with branches nearly to the ground, but it will form a beautiful umbrageous head. Its leaves are arranged in whorls of three or four, and are from 5 to 12 in. long, and bordered with sharp teeth, but sometimes they are entire. The small white flowers are arranged in long racemes, and these are succeeded by nearly spherical fruits, varying slightly in size, but often above an inch in diameter. Each fruit contains one smooth, globular, or two half-round nuts, which enclose a remarkably rich edible kernel, of excellent flavor, resembling, but superior to the filbert. The nuts, however, are very hard, and it requires some force to break them before the edible portion can be got at. It is probable owing to this circumstance that the tree is not so well and widely known amongst cultivators as it ought to be, considered from an economic point of view. It is difficult to understand, however, the reason why such a beautiful evergreen tree has not been more extensively planted in parks and gardens from an ornamental standpoint, for very few native trees surpass it in the distinctive character of its foliage.

Although I have assumed that it is probably on account of its hard-shelled nuts that this valuable tree is not more extensively cultivated in Australia, there is no reason why it should remain unknown to many of our cultivators, more especially in view of the number of superior varieties that have been raised from the typical walnut, filbert, almond, &c., and which are now extensively and profitably cultivated in many countries. From these facts it is only reasonable to suppose that if the Australian nut-tree was brought under systematic cultivation, and a careful selection of seeds made from such trees, varieties might be raised from them that would produce thinner-shelled nuts than those that are borne on the wild trees. Nature has certainly well protected this tree against extermination in its wild state by providing such a hard covering for the nucleus, but this is not the only tree that is similarly protected in its natural state. If nature had not provided such protection to the nucleus of many trees—the fruits of which we now enjoy—they would, in all probability, have been extinct long ago. The natural enemies of many of them are numerous, not to mention periodical forest fires, which would have destroyed the reproductive powers, for the time being, if they had not been well protected.

There should, at least, be one Australian nut tree grown in every garden and orchard, in suitable places, and where frosts do not occur, both for the sake of its nuts and for its fine ornamental appearance. It is a capital bee plant, and whilst it is in flower I have seen these industrious insects work at it from early morning till dewy eve. It also yields an excellent timber, which, according to Mr. Bailey, is of red colour, close-grained, firm, and prettily marked, and will doubtless become a favourite wood with the cabinet-makers. Therefore, on this account, it is well worthy of being extensively grown in forests in suitable localities. At one time the nuts of this tree formed a nutritious article of food for the aborigines, of which they are very fond.

SITUATION AND SOIL.—It seems to adapt itself almost to any kind of soil, provided that it is not too stiff, and is of good depth and naturally well drained. I have seen some very fine specimens that bore abundant crops of nuts, growing in a very light sandy soil, but it was fairly rich in humus. Before the trees are planted the soil should be prepared in a similar way to that for ordinary fruit trees, and if it is not naturally well drained this should be artificially attended to.

PROPAGATION.—The easiest and also the most natural way to propagate the Australian nut is by sowing its seeds in the autumn or spring. Having successfully raised from seed many of these trees in different ways, I can recommend the following as being about the simplest plan that can be adopted by anyone living in the country. From some light deal wood make as many extemporised boxes as there are nuts to plant. Each box should be 1 ft. square and 1 ft. deep; in the bottom bore a few holes to allow the

superfluous moisture to escape, then put in 1 in. of rather coarse cinders or charcoal to act as drainage, over this place a few partially decayed leaves, then fill up to within 2 in. of the top with a light, free, open soil, press it firmly down, and on the top of this, but in the centre of the box, plant one of the nuts and cover it with half an inch of soil. The boxes should then be set on ashes, which will prevent worms getting into the soil, in a situation where the seedlings will have plenty of light, but at the same time be protected from the fierce rays of the mid-day sun. The seedlings must be watered regularly, but with discretion. On no account should the soil be allowed to become soddened with water, or the young plants will soon present a sickly appearance from which it would take them some time to recover. Under ordinary treatment, the seedlings that are raised in this way will be ready for transplanting to their permanent quarters in about twelve or eighteen months from the time the nuts were planted. The nuts might be planted where it is intended the trees are to grow permanently, if the young plants could be regularly attended to with water, and kept free from weeds until they became large enough to take care of themselves. If such a plan were decided upon, each young plant should be protected with a small circle of 1 in. mesh wire.

PLANTING.—This is best done in March or September, after rainfall if possible, or while the soil is in a sufficiently moist but easily worked condition. On no account plant out seedlings that have been growing in pots for a long time, and are in that condition generally known as pot bound; that is those plants, the roots of which have not had sufficient room to expand, and have wound round each other many times. Such plants rarely give satisfaction, and often remain in a stunted condition for years after planting. Choose only the most vigorous and healthy young seedlings for planting out, and good results will follow. If a number of seedlings have been raised for planting in a particular place, they should at least be set out 20 ft. apart, so as to allow them plenty of room to develop into fine trees. After they have been carefully planted, each one should be tied firmly to a stake to prevent injury from winds until it becomes well established. If dry weather should ensue after the young plants are set out, they should be watered occasionally until fresh root action takes place, which under ordinary circumstances will not be long. A light mulch round each young tree would be an advantage, inasmuch as it would keep the soil cool about its roots, and prevent a too rapid evaporation of moisture from the ground. The cultivation that is required will consist in keeping down the weeds, and the soil stirred occasionally round the young plants. The only pruning that is required will consist in keeping a clean stem for a few feet above the ground, and in cutting back exuberant growths, so that the tree will form a shapely head. A grove of Australian nut-trees would form a splendid feature in the landscape. The age at which the tree comes to a bearing state varies, of course, in different situations.



MACADAMIA TERNIFOLIA, F. v. M.
"AUSTRALIAN NUT."

Under ordinary treatment, however, it may be reckoned at about seven years. It is a very prolific bearing tree. I have never counted or measured the quantity of nuts that a single tree will bear in a year, but I have counted the number that are born on some of the racemes, and they vary from three to fourteen. The nuts will keep for a considerable time after they are ripe, so that in the event of an over-production for local demands they could be shipped to any distance with perfect safety.

Reference to Plate.—The drawing was made from a photograph of a tree growing in the Sydney Botanic Gardens; *a*, portion of a raceme; *b*, a single flower; *c*, pistil, showing the hypogynous glands; *d*, perianth laid open showing the four anthers; *e*, nut; *b*, *c* and *d* magnified.

AN INTERESTING EXPERIMENT IN PASTEURISATION.

An interesting experiment was carried out last year at the Ontario Agricultural College with the object of testing the influence exercised by the pasteurisation of milk and cream upon the butter obtained therefrom. The milk experimented with was thoroughly mixed in a vat, one half of which was run through a pasteuriser, while the other half was run through a separator in the ordinary course. The temperature for pasteurising ranged from 155 deg. to 162 deg., while that for separation was 95 deg. to 100 deg. The total quantity of milk dealt with was over 5,200 gallons; and the average percentage of fat in it worked out to 3.5. After being separated it was found that the skim milk from the milk that had been pasteurised contained .04 per cent. of butter fat, whereas the skim milk in the case of that which had not been pasteurised contained .1 per cent. of butter fat, or two and a half times more than the pasteurised milk.

Notwithstanding the larger quantity of butter fat left in the unpasteurised milk, there was obtained from the latter a total of 3,496 lb. of cream, as against the 3,119 lb. of cream produced by the same quantity of pasteurised milk. The cream obtained from both sources was next analysed, and it was found that that from the pasteurised milk contained 27.3 per cent. of fat, whereas that from the raw or unpasteurised milk contained only 25.6 per cent. of fat. Nor did the comparison end here. Careful note was made of the churning results in both cases, and it was found that on an average every 1,000 lb. of pasteurised milk gave 39.7 lb. of butter, while the unpasteurised milk gave 40.2 lb. of butter. With the object of testing the quality and keeping properties of the butter obtained from the two portions of milk thus separately treated, samples were sent to two leading firms of butter merchants, who, without knowing the conditions under which they had been

produced, kept them for one, two, and three months respectively, and then judged them according to the usual market standard. As a result of this test, the three boxes of pasteurised butter averaged 42 points in flavour, and 23·6 points in grain, while that obtained from the unpasteurised milk scored 43·6 points for flavour, and 24 points for grain. Special samples were then set apart for the purpose of testing keeping quality, and after a month's storage both were again judged. This time the pasteurised butter scored 39·3 points for flavour and 24 points for grain, while the scoring in the case of the unpasteurised butter was 38·6 points for flavour and 24 for grain. After being kept for three months the pasteurised butter scored 38·5 points for flavour and 24·5 for grain, whereas the unpasteurised butter scored only 35·5 points for flavour and 24·5 points for grain, thus showing that the pasteurised samples scored distinctly in keeping quality.

The general conclusions drawn from the experiments were as follows:—(1) There was less loss of fat in the skim milk from pasteurising the whole before separating. (2) A smaller volume of cream was obtained from pasteurised milk, but the cream was richer. (3) By using a starter before cooling there was no difficulty in ripening the cream from pasteurised milk. (4) The pasteurised cream churned in less time than the raw cream. (5) The yield of butter per 1,000 lb. of milk was greater from the unpasteurised milk. (6) There was not much difference in the quality of the butter when first made, but when kept for a time the pasteurised butter possessed better flavour. The net outcome of the experiment is thus summarised by the expert having charge of the investigations:—All the trials indicate that the pasteurised milk butter had better keeping qualities, though when first made there was little or no difference in the quality. The chief advantage in pasteurisation is in making butter for the export trade or for storing, and also in winter, when feed and other bad flavours give the butter-maker trouble.

The *Lancet* says the pear mite (*Cocidomyia Nigra*) is an insect that lays eggs in the blossom of the pear, and the larvæ bore their way into the core of the young fruit, upon which they subsist. Spraying is said to be of no avail, and the only remedies recommended are the digging of the soil under the trees in the autumn to prevent the insects emerging from their retreats, and dressing the soil with one ton per acre of kainit to kill the insects.

In manuring we advise for citrus trees a high phosphatic bone dust, with 10 per cent. of potash added. All fruits contain, and all orchard soil consequently needs salt, if this is present in your land in sufficient quantity, the ten per cent. of potash may be added to your bone dust in the form of sulphate of potash. If your soil is deficient in salt, use kainit, or potash salt, and this will make up for the deficiency.

THE INSECTIVOROUS BIRDS OF WESTERN AUSTRALIA.

BY ROBERT HALL.

FANTAILS AND FLYCATCHERS.

It is the special duty of certain birds to catch flies and eat them, meaning in this case any insect with wings. But if we were to bring together all species of birds which eat flies we should have a collection of which its members would be strangely opposed.

A key to such a group would be a cumbersome one. To critically recognise a Flycatcher or a Fantail it is necessary in most cases to closely examine it. If the following characters are present, then the bird is one of the family *Muscicapidæ*. "Bill notched, broadened or rather flat, generally furnished with numerous rictal bristles, culmen heeled; wing with ten primaries, the first more or less markedly reduced in size."

The use of the word fantail is only an arbitrary one, and it cannot be separated from flycatcher in the vernacular by any scientific means, as at present known. Although used all the world over, intending to have the same meaning, the nearest approach to which we have arrived is the term fantail-flycatcher. This refers to the species of *Muscicapidæ*, which have fan-shaped tails, and which may in addition be longer than the wings.

Our black and white Fantail (*Rhipidura tricolor*, *Viell*) is an example of a whole genus which represents a number of true Fantailed-Flycatchers.

Our brown Flycatcher (*Microeca assimilis*, *Gld.*) is an example of a genus that has its wings longer than the tail; but which latter is not conspicuous when spread. Practically speaking the difference between a Fantail and a Flycatcher in this State lies in applying the term only to the genus *Rhipidura* (as per illustration).

Of this our State has three species. Two of them, *R. preissi* and *R. setosa*, are peculiar to water courses generally in heavily timbered lands, while a third, *R. tricolor*, inhabits the drier parts of the State preferably; but not the driest any more than the wettest.

Among the five species of Flycatchers found between Derby and Albany the disposition of four is to stay in the north, no record of any, as well as I know, having yet been found very far south of the Fitzroy River. I refer to *Myiagra rubecula*, *M. concinna*, *M. latirostris*, and *Sisuranana*. These species are found to range from the Fitzroy to the north and north-east of it, then across to Queensland. It is a noticeable feature that the birds of the northern portion of the continent are mostly common to each area of it, and those of the southern the same, while, upon present evidence, about seventy-five per cent. of the birds of the north-west do not spread southward.

A further knowledge of geographical distribution as far as the birds of our State are concerned is much needed. The fifth species referred to above is the Restless Flycatcher (*Sisura inquieta*) dispersed nearly over the whole of the continent.

Every Flycatcher has a "personality" peculiar to all the members of that species. Even the closely allied forms have it if we but knew. To many people they are like most other little birds, and when together in the field, the same. But this is not so. Watch carefully their habits and you will soon observe a manner of action in voice or flight that separates any two of a district. Under certain species, references to this will be made.

WESTERN FANTAIL.



WESTERN FANTAIL. NEST AND EGGS.

Rhipidura preissi, Cabani (*Rip-i-dū'ra preiss-i*).

Rhipis, a fan; *oura*, tail; *preiss*, a proper name.

Rhipidura preissi, preserved specimen, Perth Museum. "Key to the Birds of Australia." Hall, p. 17 (1899.)

GEOGRAPHICAL DISTRIBUTION.—Areas, 9, 8.

KEY TO THE SPECIES.—Tail conspicuous and longer than wing; the feathers of tail with white shafts except the two centre ones, which are brown; under surface ochreous buff, the breast uniform; throat white, no black patch on lower portion.

This little grey bird, which appears to be more tail than anything else, is a restless creature. Of the many millions of birds in a damp forest, the white-shafted species may always be quickly known by its strange flight. It does not fly from one bough direct to another any more than it soars or hovers, but it has daring little flights here, there and everywhere in the area of a few yards. This causes one to wonder what it all means. For every effect we know there is a cause, or combination, and it would be interesting to know what these flight anglers mean. Other birds that capture the small forms of life upon the wing do so by different actions. Now is the opportunity to prove one's powers of observation, and the discovery will surely be the forerunner of a greater. Further, one may wonder how true the distribution of it in the extreme north and south is. The present writer is more than half inclined to believe the very closely allied White-shafted Fantail of Eastern Australia is the same as this one in the south-west province. This is suggested because of a bird secured near Mount Barker being nearly a facsimile of the above species.

To settle a point of this kind needs many specimens, but we must learn to take care of every insect-eating bird. To many, such a bird has an unknown value. Boys know how easy it is to find the nest of the Western Fantail, and with a number how easy it is to take it, eggs and all. Would it were more difficult. As you rest among the bushes it will go straight to its nest and show the whole of its near and dear possessions. Many other birds are cunning, and it takes a day to find what in this case is shown without the search. The absolute trust is too generous. Again I plead for a reversion so that our good natures may be placed absolutely in their favour. The life of this bird is full of mystery. Why does it build a nest that tapers considerably more than others? Is it to carry away moisture, or must we look for effect before perceiving cause? Certain it is that any other bird's "cradle" is seldom more beautiful.

Nest.—Small, open, wine-glass shaped without the base of the glass; firmly built of grass and densely covered with spiders' web; lined with fine grasses. Attached to a slight horizontal branch overhanging a creek, the part of junction being quite hidden with web.

Eggs.—Two or three to a sitting; ground color creamy white, with or without a zone of nearly obsolete spots near the broadest part. Length, 0.6 inch; breadth, 0.5 inch.

BLACK AND WHITE FANTAIL (Shepherd's Companion,
Willie Wagtail).



Rhipidura tricolor, Vieill (*Rip-i-du'ra tri-hul-or*).

Rhipis, a fan; *oura*, tail; *tres*, three; *color*, colour.

Rhipidura Motacilloides, Gould, "Birds of Australia," fol., vol. ii., pl. 86. "Key to the Birds of Australia." Hall, p. 18 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 9, 8, 7, 4, 3, 2.

KEY TO THE SPECIES.—Upper surface and throat jet black; abdomen white, over each eye a narrow line of white, tail larger than wing; rectal bristles present.

This is perhaps the commonest of fantails. Wherever you go, across plains scantily timbered and feebly watered, or along well watered country, you will be sure to meet this species. The preference shown is for the drier rather than for the wetter country, for while the Western Flycatcher is within fairly well timbered land, the Black and White Fantail is a companion of the sheep and

their shepherd in grazing districts. The aborigines of the south-west tell me the bird is known to them as Chid-e Chid-e, while other notes convey to us an expression like "sweet pretty-creature." It is one of the few birds that sing, or attempt to do so, during the night. The mate to the sitting bird considers it a duty to periodically whistle through the dark hours, and many a time while camped for the night I have heard this solitary bar of notes through all the hours up to 3 a.m. Its flight is made of zig-zag movements, very low and of short duration. To secure food it is fond of accompanying animals, and one reason for seeing it near the head of a cow or horse seems to be a desire to get the insects that are attracted by the warm air expelled through the animal's nostrils. A second is that the animals draw up tussocks by the roots and thus expose the ground-boring destructive insects that mostly forage in the night. This is one of nature's provisions for subjecting nocturnal insects. It is fond of the ground, and makes a pretty picture wherever it may be.



NEST AND EGGS OF BLACK AND WHITE FANTAIL.
(Two-Sevenths Natural Size).

Nest.—Very compactly built of grass, covered densely with spiders' webs and taking the form of a shallow cup; the inner lining is of roots of finer grasses. I have seen a nest altogether made of sheep's wool. The position varies with the nature of the tree or shrub. Nests have been placed upon the bare rails of fences.

Eggs.—Three or four to a sitting, dull yellowish-white, with a zone of dark grey or blue-black. Length, 0.75 in.; breadth, 0.55 in.

RESTLESS FLYCATCHER (Scissors Grinder).

Sisura inquieta, Lath. (*Si-su'-ra in-qui-et'a*).*Seio*, to shake; *oura*, tail; *inquietus*, restless.

Sisura inquieta, Gould, "Birds of Australia," fol. ii. pl. 87. "Key to the Birds of Australia." Hall, p. 19 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 9, 7, 6, 4, 3, 2.

KEY TO THE SPECIES.—Under surface white, no black on throat; at times a rufous tint on breast; upper surface shining bluish black. Wing, 4 inches; tail, 3 inches.

There appear to be two "Black and White Fantails" in the central districts. Such there certainly are, but until the fact that one has a black throat and the other a white one is noted, they are considered one. Beyond this, the question of vocal differences come in for consideration. While this species is the "Scissors Grinder" the *Rhipidura tricolor* has a series of notes like "sweet-pretty-creature" uttered at lengthened periods. There are also other calls which may be heard principally in the spring season. Mr. Gilbert upon notes made along the Upper Swan, speaks of its vocal powers in the following way:—

"The general note is a loud, harsh cry, several times repeated. It also utters a loud, clear whistle, but its most singular note is that from which it has obtained its colonial name, and which is only emitted while the bird is in a hovering position at a few feet above the ground. This noise so exactly resembles a grinder at work, that a person unaware of its being produced by a bird, might easily be misled. Its mode of flight is one of the most graceful and easy imaginable; it rarely mounts high in flying from tree to tree, but moves horizontally with its tail but little spread and with a very slight motion of the wings. It is during this kind of flight that it utters the harsh note above mentioned, the grinding note being only emitted during the graceful hovering motion. The object of this appears to be to attract the notice of the insects beneath, for it invariably terminates in the bird descending to the ground, picking up something, flying into a tree close by, and uttering its shrill and distinct whistle."

Nest.—In many respects it is like that of the last described (*R. tricolor*) differing principally in so far as less cob-web is used to encircle it. Cup-like and rounded, diameter, 2.5 inches. I know a nest built of sheep's wool entirely. A sheep had died and the birds made use of the opportunity to build easily. This was done within a few yards of the carcase.

Eggs.—Two to three eggs, dull white, marked by spots of reddish and lilac drab, the latter as if beneath the surface, much bulged in appearance. Length, 0.85 inch; breadth, 0.7 inch.

LESSER-BROWN FLYCATCHER (Stump-bird; Peter-Peter).

Macroeca assimilis, Gould (*Mi-kre'ka as-sim'i-lis*).*Mikros*, small; *oikos*, house; *assimilis*, like.*Macroeca assimilis*. Preserved specimens Perth Museum. "Key to the Birds of Australia," Hall, p. 13 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 9, 8, 1.

KEY TO THE SPECIES.—General appearance brown; abdomen and under tail coverts white; outer tail feathers blackish brown, white at tip of inner web, and along outer one, wings very long (3.25 in.), distance between wing and tip of tail not exceeding length of tarsus; bristles at rectus.

If one watches this bird for a few moments it will be unmistakably thought that it is a fly-catcher, and we are not likely to confuse it with another brownish fly-catcher, because the tail is much shorter than that of the Western species (*Rhipidura preissi*). If it is one of the least ornamental birds in Australia there are some compensations. The graceful actions and pleasing voice make up for much that is absent, not to mention its charmingly small house, through which it has probably received its classical name. Passing flies have to run the gauntlet when approaching this species, because it generally waits for its prey in pairs. By waiting I mean that a given area of ground is worked with the eye as the birds perch on stumps, and when the time for attack comes they simply fly out, capture, and return to the same stumps for several times in succession. It also forages amongst the foliage according as the weather is suitable or not. All day long a lateral movement of the tail is effected. The fascinating ways, and the opportunity to note them and their nesting habits are so readily secured, that one is drawn to watch it, and become interested also in its nest. One was built near a roadside, so prettily ornamented on that side, that I feel inclined to maintain it has a sense of the beautiful. Passers by could easily observe the special uniform bark-lamellæ, whereas the other side, away from view, was devoid of taste and uniformity. If the eggs are extracted from a nest the owner will, with the same material, rebuild elsewhere near at hand. Both sexes are gentle, and to remove a sitting bird you will often enough require to despatch sticks before dislodging what our boys at times call the "White Peter" or "White Robin." Although two eggs form the clutch, on three occasions I have noted four was the number in all, and in one case, as late as 26th February, 1895. It was in a Cleopatra apple tree, and situated four feet from ploughed ground. October is the general month for building.

Nest.—Open rounded, shallow and very small, made of dry grasses and ornamented very often by bark-lamellæ. It is placed in a small horizontal fork, generally six to ten feet from the ground, diameter two inches.

Eggs.—Two, sometimes three, or rarely four. There is much color variation, but mostly dull green with reddish and lilac spots that have brown in them to blend the whole. Length, 0.75 in.; breadth, 0.6 in.

YELLOW-TINTED TREE-TIT.

Smicrorhis flavescens, Gld. (*Smicrorhis flavescens*).

In the last issue of the JOURNAL the following description of the eggs of this tit was omitted:—

Eggs.—Two or three to a sitting, pale brownish ground color, with slightly darker spots upon it, especially at the broader end where a zone is formed. Length 0.6 in.; breadth 0.5 in.

CURING BACON.

In the course of the paper on Bacon-curing which he recently read before the Bedfordshire Farmers' Club, Mr. Loudon M. Douglas said:—

“The process of curing or salting bacon is a very simple one, but at the same time a thoroughly scientific one. The following is a description of the process in somewhat technical language, but it conveys actually what takes place:—‘Salting, as commercially practised, is a process of osmosis or diffusion, a crystalloid applied externally, either as a solid or in strong solution, diffuses into the interior, while the soluble albuminous matters pass out into the brine. Soluble mineral salts and sugar also act as partial desiccators by their affinity for water. The flesh is deprived of a great part of its putrescent constituents, but at the same time loses a corresponding nutritive value—Liebig estimated the loss at one-third to one-half—and leaves nearly insoluble fibrinoids partially hardened and less digestible.’ Deprived of technicalities, this simply means that we destroy a certain portion of the meat in order to preserve the remainder, and in the process we render the remainder more difficult of assimilation than it was when fresh. Salted or cured meats, therefore, are less valuable as foods than fresh meats. But as it is impossible to conduct the human economy on fresh meats, it is not likely that a general knowledge of this fact would alter the consumption.

The displacement of the albuminous compounds referred to is termed ‘curing’ and is carried out thus:—The sides are laid on benches and pumped in about seventeen places with a pickle testing 100 deg. on the (Douglas) salinometer at 60 deg. Fahr. The pumping pressure should be 40 lb. per square inch as indicated on an ordinary pressure gauge. The sticks of the pump needle are all into the flesh parts, the thin flank not being pumped at all. The pickle used consists of 55 lb. salt, 5 lb. saltpetre, 5 lb. antiseptic and (in winter only) 5 lb. of pure cane sugar. These ingredients are made up to 20 gallons with fresh water and stirred until the whole are dissolved. The pickle is then allowed to settle until clear, and is better if it is boiled and skimmed. In any case the

clear pickle is run into the cellar, and is not used until it is of exactly the same temperature as the cellar. Immediately after the sides are pumped they are laid down, rind downwards, and covered lightly with an equal mixture of dry antiseptic and fine saltpetre. On top of this is laid a heavy layer of salt. The sides are 'stacked' one on top of the other, and the thin flank, or belly portion, is kept up by the means of oak staves. The pickle, therefore, which naturally forms, collects in a sort of saucer formed by the ribs.

The stacks are not meddled with until their cure is complete, which is in ten days for 9-score and twelve days for 10-score pigs. After that time in salt the bacon is 'struck,' and, according to the market to be supplied, is drained, washed, trimmed, and sent off. Much of the bacon consumed in England is smoked, and many factories have facilities for smoking. The smoke store wants a good deal of watching and care, and should always be under a competent man. Cured bacon is drained from seven to ten days, and is then washed, wiped, and trimmed. It is then dusted over with pea meal, and hung in the smoke store for three days at a temperature of 85 deg. Fahr. The smoking material used is oak sawdust. After the bacon is smoked it is packed up in bales with clean barley or wheaten straw between each side, and is sent out. When the bacon reaches the provision shops it is cut up into recognised sections; there, so far as we are concerned, its history ends.

An equally important industry is ham curing. This industry is limited in England because of the difficulty of getting rid of the remainder of the carcasses. The two legs forming the hams bring a very high price by themselves, more especially in Paris. It therefore pays well enough to dismember the pig and convert it into hams, Cumberland cut bacon, rolls, etc. Hams require very careful treatment. The cure is on precisely the same principle as bacon curing, and the same curing materials are used. But if taint is to be avoided, 'purging' has to be done so as to get rid of the blood in the blood vein. The general rule, so far as time for curing is concerned, is to allow one day for every pound weight, adding on three clear days for 'purging.' In most bacon factories where hams are cured they are dried also; another operation is conducted very slowly at a temperature of 80 deg. Fahr. If pale dried hams are wanted quickly they are dried in the smoke stores at a temperature of 90 deg. Fahr. for three days.

Of various cuts of bacon there is no end. Every locality seems to have its own peculiar cut, and this is very confusing and very useless; but there is a tendency to increase rather than diminish the various cuts. If all bacon was simply designated with the name of the county or town in which it is cured the distinctions would be in reason, but at the present time 'Wiltshire' bacon is made anywhere, 'York' hams are made mostly in Dublin

and Cork, and so on. Besides bacon and ham curing, there are also other industries carried on, such as lard making and sausage and pork pie making. These operations are long, and require skilled labour to be remunerative. Sausage making also is an auxiliary department to which much profit is attached. Its intricacies would take too long to describe. One cannot but be struck with the enormous number of products that come from the pig. To mention only a few, we have bacon, hams, lard, lard oil, stearine (used for margarine), albumen from the blood, tooth brushes from the bristles, glue and gelatine from the bones, yellow prussiate of potash from the toe-nails, hair for bedding, chair stuffing, &c., sausages, pork pies, brawn, pepsin, leather used for saddles, tires, purses, book-binding, &c. The multitude of products is bewildering, and one can only contemplate with wonder that the pig is so persistently neglected as a factor in the economy of the farm."

THE POULTRY YARD.

COLD STORAGE OF EGGS.

(By J. W. M. in the *Adelaide Observer*.)

It is only within the last few years that much attention has been paid in the direction of perfecting any mode for keeping eggs during the "glut" of the season. It is quite evident as the storage of fresh eggs becomes more generally observed, and the good results better known, large quantities will be put aside in the plentiful and cheap season of the year. The natural result will be that in consequence of the relieving the heavily laden market at the plentiful season, prices will not fall quite so low as in the past, and the placing on the market of these stored eggs in the scarce season will greatly reduce the high prices usually gained. New laid eggs that go as low as $4\frac{1}{2}$ d. and 5d. per dozen in the plentiful season will probably not, or should not fall below 8d. or 9d. per dozen, while the prices in the scarce times, ranging now and then up to 2s. 6d. per dozen, would not go above 1s. 6d. or 1s. 9d. at the very outside. If the minimum price of eggs was, say 10d. per dozen, and the maximum 1s. 6d., things would be better for all concerned. The producer would be amply paid for the outlay and trouble expended, and the consumer would be able to have new laid eggs, or equal to them, at any time of the year at a moderate price that would not hurt the purse even of the poorest. For years past experiments have been tried in America and elsewhere to preserve eggs by the cool storage process, resulting in successful returns, both financially and in point of quality. It is quite feasible that

cool storage would result in good returns, as the excessive quantity of eggs comes as the weather starts to warm up in the spring and early summer, and whatever process is used coolness is needed for a successful issue. According to official reports in the *New South Wales Government Gazette* during the season of 1897-8 the Government of that State, having established the possibility of adopting the cool storage system, invited the poultry raisers and egg merchants to store eggs with them in commercial quantities. In the following season a few enterprising growers and merchants responded to this invitation, and the Government received 11,000 dozen to experiment upon. That the results were good may be gathered from the fact that during the next season, 1899 and 1900, this quantity increased to no fewer than 93,000 dozen, supplied by about 100 persons, and it is anticipated that that quantity will be exceeded this season.

The Government of New South Wales recently issued a manifesto with directions, for the information of farmers and others desirous of placing eggs in cool storage, and some extracts from this information will be useful. In order that eggs may be kept fresh and good from four to six months, it is necessary to see that they should be all new laid. Where possible, it is also advisable to have them infertile, as, when fertile eggs are exposed to a temperature of 98 to 100 deg. for even a short time, the germ will start into life, and no subsequent treatment will avail to give them the quantity of freshness. Eggs for storage should be gathered every morning before the sun has gained strength, and placed at once in the storage boxes in a cool place. To attain the highest success they should be graded as to colour and size, the boxes being marked accordingly. Care should also be taken to have them clean and free from stains. The boxes used should be of the usual trade size, holding 36 dozen, and packers should see that they are made of odourless wood, as eggs are peculiarly liable to absorb flavours. Another important point is to see that the boxes and fillers are thoroughly dry before using, otherwise mustiness is almost sure to ensue. Beyond the "fillers," which are made of tasteless cardboard, no packing of any kind should be used. Eggs for storage should be forwarded as soon as packed, by the quickest conveyance possible, and not left about for days at a stretch before being placed in a cool chamber, and they must be handled with the greatest care in transit. The charges made by the Government were light, so that all could participate in the profits gained. The charge of receiving and delivering amounted to 3d. per case, while the cost for cool storage was 3d. per week per case—or, in other words, at this figure eggs could be stored for 11 weeks for 1d. per dozen the whole time. These instructions and directions were closely adhered to by many, and good results followed; but others, having failed to carry them out in all detail, were only moderately successful. The principal cause of failure was from ignoring the most important point of having the boxes and "fillers" absolutely

dry before using. With a consequence that eggs packed in newly made cases, where the wood was not seasoned, became bad, while others in dry cases, packed in exactly the same condition, were perfectly fresh. In other instances chaff and other materials were used to pack and to put at the bottom of the case, thus collecting the moisture, and risking the whole case by giving them a musty taste and appearance. In other instances, where the package was not a total success, the fault lay in not using totally fresh eggs, or getting them broken in transit to the cool chamber. When marketing eggs kept with the cool storage process, care must again be exercised. Eggs should not be taken direct from the cool room to the sale room, but be allowed one day or even two to gradually "cool off." When taken out of the cool chamber the air condenses on the eggs like dewdrops, and buyers fight shy at once and do not like to trust them. If, however, they are repacked from the cases into the ordinary sale boxes, and the moisture dried up, they have every appearance of a newly laid egg, and, in fact, they have all the properties thereof. There is always a strong prejudice against anything new, but this may be got rid of by placing only the good and reliable article on the market. As it is, the inferior and damaged article spoils the prices, and reduces the estimation of the good. It has been proved beyond a doubt that fowls fed upon a good wheat diet produce eggs of a better flavour and keep better than those from fowls fed upon soft food and scraps, or that have little or no food supplied to them at all. To give a practical idea of the good results accruing from cool storage system, I quote results attained in New South Wales from the Government official *Gazette*:—Lot A—Cost at the time of storing, $7\frac{1}{2}$ d. per dozen; storage, averaging 29 weeks, $2\frac{1}{2}$ d.; handling and interest, about 1d.; breakages, about 1d.; total, 1s. These were sold for 1s. 8d. to 1s. 10d. retail, leaving a profit of 8d. to 10d. per dozen to the owner. Lot B—Cost when stored, 8d. per dozen; storage, $2\frac{1}{4}$ d.; handling, &c., 1d.; breakages, about 1d.; total, 1s. $\frac{1}{4}$ d. Sold in case lots at 1s. 4d. to 1s. 6d. per dozen. Lot C—Cost when stored, $7\frac{1}{2}$ d. per dozen; storage, $2\frac{1}{2}$ d.; handling, &c., about 1d.; breakages, about 1d.; total, 1s. Sold in lines for 1s. 2d. to 1s. 4d. per dozen. Lot D—Sold at from 10d. to 1s. 1d. and 1s. 3d., with a cost upon them of 1s. $\frac{1}{2}$ d., this being due to insufficient care being exercised in selecting and packing as directed.

For an orchard of stone fruits we recommend blood and bone manure with 10 per cent. of sulphate of potash added, or a special and complete fertiliser, which may also be used for citrus trees, instead of the bone dust and potash. In either case, the manure should be well covered, the most effectual plan being with the spade or fork; hand cultivation, though costing more, is always worth more than mere ploughing.

NINTH ANNUAL CONFERENCE OF PRODUCERS.

The Ninth Annual Conference of Delegates from the Pastoral, Agricultural, Vine, Fruit-growers', Botanical, Poultry, and Bee-keepers' Associations of Western Australia was opened in the Museum of the Department of Agriculture, in *West Australian* Chambers, March 5th, 1901. The President of the Agricultural Advisory Board (Mr. Charles Harper, M.L.A.) occupied the chair, and seated close to him were the Premier (Mr. Geo. Throssell, M.L.A.), the ex-Premier (Sir John Forrest, Minister for Defence in the Federal Government), the Minister for Lands (Mr. C. J. Moran), the Minister for Mines (Mr. H. B. Lefroy), the Colonial Secretary (Mr. Geo. Randell), and the Attorney-General (Mr. R. W. Pennefather), while in the body of the hall were over 80 representatives of the various producing bodies of the State.

Proceedings were opened by an address from the Premier (Mr. G. Throssell, M.L.A.), followed by the Minister for Lands (Mr. C. J. Moran), and the Right Hon. Sir John Forrest (Minister for Defence in the Federal Government). An adjournment was made at one o'clock, and business resumed at 2.30 and continued to 5.30. On Wednesday, business was commenced at 9.30; at one o'clock the Conference adjourned in order to attend the opening of the National Show, which took place at the Queen's Hall, at three o'clock, business being resumed again at 6.30 in the evening, until the adjournment at 10 p.m. On Thursday, the Conference commenced at 9.30 a.m., and sat until 12 noon, when the whole of the delegates, together with a number of guests, boarded the "Manx Fairy" for a trip down the river. A stay was made at Point Walter, where luncheon was partaken of, after which the journey was continued to Fremantle, and a tour of inspection of the harbour works was made. On Friday morning business was resumed, and the end of the agenda paper was reached at 1.30. A vote of thanks to the Chairman and Secretary of the Department bringing the Conference to a close. During the morning the greater number of the delegates formed themselves into a deputation in order to wait upon the Minister for Railways to bring certain matters that had been discussed at the Conference under his notice. On Friday evening at 8 p.m. the delegates entertained the Advisory Board, the Secretary and Officers of the Department and a number of visitors to a smoke social in the Museum of the Department, when a very enjoyable evening was spent.

THE AFTERNOON SITTING.

The business of the Conference commenced at 2.30, Mr. C. Harper, M.L.A., presiding.

The Secretary for the Department of Agriculture intimated that the Exchange Club had made the Delegates hon. members of the club, during their stay in Perth. Some exhibits at the Show had

been neglected, and needed attention. The Show would be closed, to permit the judges to get through their work, at 9 o'clock in the morning, so that the Delegates in charge of these exhibits should get to work that evening. The Secretary further announced that the hour for the departure of the steamer "Manx Fairy" on Thursday had been altered from one o'clock to 12 noon.

On the motion of Mr. Gell, the East Beverley Agricultural Society was re-instated on the list of societies registered with the Department.

Mr. Yelverton raised the question as to how many resolutions passed at the previous Conferences had received attention at the hands of the Government, and what had been done in these matters? He thought that unless their desires were given effect to it would be useless continuing the Conferences, as many of them could better utilise their time.

The Secretary for the Department of Agriculture having supplied the information in detail,

Mr. Yelverton said he listened to the replies made by the Secretary, and he did not think the Government had taken much notice of their wishes. He would give notice of motion—

"That in the opinion of this Conference, it is little use meeting in Conference in future, unless greater effect is given to the resolutions carried."

THE RABBIT INVASION.

Mr. Solomon thought that the first six resolutions on the agenda paper should be embodied in one. He thought they could not understand what a destructive pest the rabbits were. He would move—

"That in the opinion of this Conference the Government should take immediate steps, and spare no expense, in preventing the further incursion of rabbits into this State; and that the Government, in order to check the progress of rabbits into this State, should at once erect a rabbit proof fence."

Mr. Lang seconded the motion.

Other Delegates urged that the resolution, as originally stated, should stand, and that the Conference should wait on the Minister as a deputation.

The Chairman pointed out that at the present time there was a Royal Commission dealing with the question, and he did not think much good could be achieved by a deputation until the Commission's report was put in.

After a good deal of discussion the motion was carried.

IMPORTED POULTRY.

Mr. N. M. Brazier moved—

"That in the opinion of this Conference it is desirable to make immediate recommendations to the Government with a view to fixing the maximum duty on imported poultry; for the better discovery, treatment and prevention of diseases in poultry, and for

the better handling and carriage of poultry over our railways, and that a sub-committee be appointed from this Conference to make such recommendations to the Secretary, Department of Agriculture, to forward to the Minister."

Mr. Chas. Florentine, Albany, seconded the motion, which was carried.

RAILWAY RATES.

Mr. J. Mowforth moved—

"That in the opinion of this Conference the railway rates for the carriage of stock and produce need early revision, and that a sub-committee consisting of the delegates from the Chapman, King River, Albany and Kelmscott Associations be appointed to report to the Conference for general discussion."

Mr. H. Garraway seconded the resolution, which was carried.

The delegates appointed in the resolution retired to the committee room, and after considerable debate, the Chairman of the committee (Mr. Mowforth), on returning to the conference room, moved—

"That in the opinion of this Conference the resolutions of previous Conferences in reference to railway rates, not having been given effect to, the Minister of Railways be urged to at once have the rate book revised by the insertion of the words 'and garden produce,' on lines 2 and 20 of page 47, and that 'special fast produce trains should be run from the costal districts to the eastern goldfields on fixed dates, as traffic warrants,' and that a deputation from this Conference wait upon the Minister for Railways to urge that the resolution be at once given effect to."

Seconded by Mr. H. Garraway, and carried unanimously.

IMPROVEMENT OF STOCK.

Mr. W. J. Ecclestone moved—

"That in the opinion of this Conference the time has now arrived when the Government should take steps to encourage the breeding of horses for army remount purposes, either by importing stallions and allowing them to stand in different centres at a low fee, or in any other manner that may be decided upon."

Mr. Solomon, in seconding the motion, held that if the Government could spend £10,000 in assisting the viticultural interest, it should spend a few hundreds in importing stallions to improve the horses in this State, on the same lines that had been adopted with regard to the dairy industry.

After slight discussion the motion was carried.

The Conference, at 5.30, adjourned until 9.30 on Wednesday morning.

SECOND DAY.

THE MORNING SESSION.

The Conference resumed its consideration of matters on the agenda paper on Wednesday morning at 9.30. The Chairman of the Advisory Board (Mr. C. Harper, M.L.A.) presided. Mr. E. McLarty, M.L.C., occupied a seat at the table.

THE BOT FLY.

Mr. Flavel moved—

“That in the opinion of this Conference, when horses die from doubtful or unknown causes, the carcase should be immediately burned in order to prevent the propagation of the Bot fly, and that owners of animals dying from doubtful causes be urged, in all cases, to send the stomach and a description of the symptoms to the Department of Agriculture for report.”

Mr. Yelverton seconded the motion, which was carried without discussion.

SUBSIDIES TO SOCIETIES.

Mr. J. Mowforth moved—

“That in the opinion of this Conference the scheme suggested by the Secretary of the Department of Agriculture in his Annual Report to June 30th, 1900, with reference to the allocation of Government Grants to agricultural societies, should be supported, and that the said subsidies should be paid through the Department of Agriculture, and that no society shall be subsidised which subscribes less than £25 in prize money in any one year.”

Mr. W. J. Stewart seconded the motion.

The Chairman said that the motion would not prevent the Minister for Lands granting assistance to any new societies, but its intention was to place the matter of subsidies, granted by Parliament, on a proper basis.

After discussion the motion was put and carried.

EXPERIMENTAL FARM.

Mr. W. E. Ash moved—

“That in the opinion of this Conference the State Government should, as soon as possible, establish and equip an experimental farm.” He said that a similar resolution had been carried at every Conference he had attended, but the Government seemed to take no notice of the matter.

Mr. Clifton seconded the motion, and from his experience he considered such a farm was necessary.

The Secretary, in answer to Mr. Solomon, said that the experimental plots under Mr. Berthoud's management were under the supervision of the Department of Agriculture, whilst the forestry work was under the Forestry Department.

Mr. Sutton considered that the experimental plot at Drakesbrook had been successful, but they required a larger field for experimenting.

The motion was carried unanimously.

EXPERIMENTAL PLOTS.

Mr. Solomon moved—

“That in the opinion of this Conference the Department of Agriculture should establish experimental stations for the testing of seeds, manures, and special products in each of the chief districts of the South-West land division of the State, and that before doing so the advice of local societies should be asked as to location.”

Mr. W. J. Ecclestone seconded the motion, which was carried..

HANDBOOK OF HORTICULTURE AND VITICULTURE.

Mr. W. J. Ecclestone moved—

“That in the opinion of this Conference a second edition of the Handbook of Horticulture and Viticulture is urgently needed, and that the Government be asked to make special provision for this on the estimates of the Department of Agriculture.”

Mr. J. Partridge seconded the motion, which was carried.

TREES TRUE TO NAME.

Mr. A. Sharp moved—

“That in the opinion of this Conference, legislation should be passed compelling nurserymen, under penalty, to supply plants and trees true to name, and that all vendors and agents for the sale of trees and plants be registered.”

Mr. J. B. Miller seconded the motion.

The Chairman said he could sympathise with the object of the motion, but he thought that if the owners kept a record of the names, places, and dates of the trees planted, a civil action would lie should it be found later on that the trees were found not true to name. Unless the owners kept those records for the purpose of evidence, no Acts would be of any use to them.

The motion was carried.

LESSONS IN PRUNING FRUIT TREES, ETC.

Mr. Hayward moved—

“That in the opinion of this Conference a Government expert should be appointed to travel the South-West portion of the State to give practical illustration on the pruning of fruit trees.”

Mr. Lang seconded the motion.

The Secretary for the Department of Agriculture stated that he very much regretted that they could not make a place to place visitation, on account of the Department being so short handed, and the want of funds to enable him to increase the staff.

The motion on being put was carried.

NOXIOUS WEEDS.

The Secretary for the Department of Agriculture explained what had been done with regard to the administration of the Noxious Weeds Act. Of the 115 circulars he had issued to Municipal Councils and Road Boards, asking for assistance in eradicating

noxious weeds, he had received only 12 replies. There was at present £200 on the estimates for this work, but stinkwort alone, he believed, would take £5,000 a year to eradicate. He asked for the Delegates' assistance in this matter.

Mr. G. Bishop moved—

“That in the opinion of this Conference the eradication of stinkwort and other noxious weeds should be attended to, and that local boards should be appointed with power to enforce the Act.”

Mr. McKinley seconded the motion.

Replying to Mr. McKinley, the Secretary for the Department of Agriculture stated that the Midland Railway Co. had been notified to take steps to eradicate the noxious weeds on their property. Failing to comply with a further notice he had written the day before, the Secretary stated that the Minister would doubtless exercise the powers he held under the Act.

The resolution was carried.

SCARCITY OF LABOUR.

Mr. D. S. Morrell moved—

“That in the opinion of this Conference the Government should take immediate steps to secure an adequate and regular supply of rural labourers.” He said that the scarcity of labourers was likely to paralyse the farming industry. The labourers that would come from the public works on their completion were not of the right class for agriculture, and he thought the Government should endeavour to introduce a system for inducing suitable immigrants to settle in Western Australia from the country districts of Great Britain, on the lines of Canada.

Mr. Macpherson seconded the motion.

Mr. Hayward supported the object of the motion, but feared the Government could do nothing in the matter.

A delegate who opposed the motion stated that the public works would shortly be completed, and they did not require a glut of labour on the market.

Another delegate thought they might look to Ireland or Germany for the class of labourers that was most desirable.

Another speaker held that if the farmers would endeavour to keep their labourers throughout the year, they would have little difficulty with their men.

Mr. Burgess maintained that they should encourage the immigration of married men, who would remain in the country.

A delegate remarked that it was beneath the average Australian who followed up public works to work on a farm.

After further discussion the motion was put and carried.

ADJOURNMENT.

The Conference at 12.55 adjourned until 7.30 p.m. to enable the delegates to attend the opening of the National Show that afternoon.

THE EVENING'S SITTING.

The Conference resumed its sitting at 7.30 on Wednesday evening.

THE AGRICULTURAL BANK.

Mr. A. Sharp moved—

“That in the opinion of this Conference the Agricultural Bank Act should be so amended as to bring it into conformity with the Credit Foncier System.” He contended that the present Agricultural Bank had failed to be of any use to the settler without certain capital, as it would not lend any money on security already on the land.

Mr. J. Miller seconded the motion.

Mr. A. R. Richardson said he was not there to apologise for the Agricultural Bank, but he thought the case had hardly been put fairly. He understood that the manager had to be assured of the *bonâ fides* of the applicants before making money advances; and another thing, the manager was the custodian of the public money, and perhaps the objections to the bank raised were made on the part of those who had not inspired the manager with much confidence. Another thing, the Credit Foncier System had not been explained, and it might be well to give the Conference some further explanation on this system.

The Chairman explained that the Agricultural Bank money could not be used to pay off a mortgage, whilst he believed that this could be done in Victoria under the Credit Foncier System. The discussion was an important one, and if it were found that the Credit Foncier System had been satisfactory in Victoria, he saw no reason why it should not be introduced here.

The motion was carried amidst applause.

ANALYSIS OF SOILS.

The Secretary stated that each analysis cost in chemical materials about seven guineas, and he hoped that in discussing the motion they would consider this, and decide whether it would be better to advise the appointment of an analyst to the Department or agree to pay half the cost with the Government for analyses of soils of the district.

Mr. J. Sutton moved—

“That in the opinion of this Conference the analyses of soils should be made a special feature in the proposed experimental plots.”

Mr. R. Urch seconded the motion, which was agreed to.

NOXIOUS TRADES AREAS.

Mr. Hayward moved—

“That in the opinion of this Conference the Government should encourage the manufacture of artificial fertilisers within the

State, by declaring areas upon which such trades may be conducted."

Mr. Drew seconded the motion, which was carried.

AMENDMENT OF BOILER ACT.

Mr. W. J. Stewart moved—

"That in the opinion of this Conference the examination of boilers, used solely for agricultural purposes, once in every two years is ample, and that the Act be amended accordingly."

Mr. Morgan seconded the motion.

The discussion showed that a good deal of inconvenience had been caused by the present clause in the Act.

REGISTRATION OF DOGS.

Mr. Lang moved—

"That in the opinion of this Conference the Government compel all owners to register their dogs, and to carry a disc with the number of Register and district stamped thereon."

Mr. Halligan seconded the motion, which was carried.

NATIVE DOGS.

Mr. Brown moved—

"That in the opinion of this Conference it is desirable to form Dog Boards, in the districts interested, with a view to eradicating the pest, and that the Government give such assistance as may be required, and also increase the bonus to £1. Where no such board exists, boards to be formed by the Resident Magistrates of the various districts, and to be approved by the Government."

Mr. Ash seconded the motion, which was carried.

REWARD FOR EAGLEHAWKS.

Mr. Partridge moved—

"That in the opinion of this Conference the Government should offer a reward of not less than two shillings and six pence per head for all eaglehawks destroyed."

The motion was seconded by Mr. Bishop and carried.

WILD DUCK CLOSE SEASON.

Mr. Layman moved—

"That in the opinion of this Conference the Government should declare a two years close season for ducks, commencing from 31st December, 1901."

Mr. Lang seconded the motion, which was carried.

ADJOURNMENT.

At 10 p.m. the Conference adjourned until half past nine a.m. the following day.

THIRD DAY.

THE MORNING SITTING.

The Conference resumed its sittings on Thursday morning, Mr. C. Harper, M.L.A., presiding. Mr. E. McLarty, M.L.C., also being present.

ROADS BOARD ACT.

Mr. J. Mowforth moved—

“That in the opinion of this Conference it is to be regretted the amendments of the Roads Board Act, requested by the Conferences of several years, and promised by the Government, have again been shelved, and this Conference again urges upon the Government the necessity of introducing the necessary Bill into Parliament at the earliest possible moment; and that copies of the draft Bill be submitted to the various societies before being submitted to Parliament.”

Mr. J. Winter seconded.

An amendment by Mr. Edwards—

“That the notices relating to Roads Boards were matters that should be dealt with by the Roads Boards’ Association, and not by the Producers’ Conference,” was lost.

The motion on being put was carried.

PASSES FOR ROADS BOARDS CONFERENCES.

Mr. J. F. Morrell moved—

“That in the opinion of this Conference delegates to Roads Boards Conferences should be allowed free passes by rail to any districts where such Conferences may be held.”

Mr. Brooks seconded. Carried.

WEIGHBRIDGES AT STATIONS.

Mr. Lynch moved—

“That in the opinion of this Conference all railway stations should be supplied with a cart weighbridge.”

Mr. Stewart seconded the motion, which was carried.

DEPUTATION.

Mr. Solomon moved—

“That a deputation consisting of all the delegates should wait upon the Minister of Railways to bring before his notice all railway matters that had been dealt with by the Conference.”

Mr. Williams seconded the motion, which was carried unanimously, the Secretary being asked to make the appointment with the Minister for the following morning.

TESTING WEIGHBRIDGES.

Mr. Wilton moved—

“That in the opinion of this Conference it is desirable that the Government instruct the Inspector of Weights and Measures to make provision for the maintaining of the accuracy of the weighbridges at railway stations.”

Seconded by Mr. Halligan and carried.

FENCING RAILWAY YARDS.

Mr. Ewin moved—

“That in the opinion of this Conference the Government be asked to fence in all yards at railway stations in populated districts.”

Seconded by Mr. J. B. Miller, and agreed to.

CANNING JARRAH RAILWAY.

Mr. C. H. Brooks moved—

“That in the opinion of this Conference it is desirable that the Government purchase the Canning Jarrah Company's Railway.” He pointed out that at the present time investors in property in the neighbourhood concerned, and many growers, were afraid to extend their operations in the fine vineyard lands of Gooseberry Hill and other districts, owing to the fear that the Canning Railway Company would remove their Mills to some other part of their concessions and by doing so, cease using the present line of rail.

Mr. R. Urch seconded the motion.

Mr. Solomon pointed out that it was little use approaching the Government in its present state, and he urged better results would be obtained if each delegate would approach candidates for election and pledge them to support the purchase of this railway.

The motion was carried.

RECEIPTS FOR GOODS.

Mr. Layman moved—

“That in the opinion of this Conference the Railway Department should be required to give receipts for goods handed in at sidings.”

Mr. Lang seconded the motion, which was carried.

CARRIAGE OF PERISHABLE GOODS.

Mr. G. Sinclair moved—

“That in the opinion of this Conference it is desirable that the Railway Department receive and forward all perishable goods on holidays, and on Saturdays up to 4 p.m.

The motion was seconded by Mr. Edmondson and carried.

At 12 o'clock the Conference adjourned until half-past nine a.m. the following day in order to accept the Department's invitation to a trip down the River and inspection of the Fremantle Harbour Works.

FOURTH DAY.

The Conference resumed its sittings on Friday morning, Mr. C. Harper, M.L.A., occupying the chair.

Replying to Mr. Solomon, the Secretary for the Department of Agriculture stated that it had been arranged for the deputation to wait on the Minister for Railways at half past 10 o'clock.

RAILWAY LINES—BURNING OFF.

Mr. Chas. Mitchell moved—

“That in the opinion of this Conference the present method of burning the grass on railway lines in agricultural districts is positively dangerous, and should be done before the crops are ripening; and further, the Conference is of opinion that burning on hot days is particularly dangerous.”

The motion was seconded by Mr. Solomon, and carried.

BURNING OFF.

Mr. Bishop moved—

“That in the opinion of this Conference the time for burning off timber for agricultural purposes should be advanced one month, viz., from the 1st of March to the 1st of February, and that Roads Boards be appointed to give or refuse permission to burn off as they may deem expedient.”

Seconded by Mr. Morgan, and agreed to.

At this stage the Conference adjourned for the purpose of forming themselves into a deputation to wait on the Minister for Railways, in order to lay all matters dealt with at the Conference, connected with his department, before him.

Conference resumed at half past 11 a.m.

RE-VALUATION OF SUBURBAN BLOCKS.

Mr. Fitzpatrick moved—

“That in the opinion of this Conference the Government should re-value suburban blocks throughout the State, with a view to reducing the price, many of them being too rocky for cultivation, and fit only for paddocks for stock.”

Seconded by Mr. W. J. Stewart, and carried.

USE OF LAND REVENUE.

Mr. Whistler moved—

“That in the opinion of this Conference the Government should be asked to devote 5 per cent. of the Land Revenue to the direct assistance of agricultural progress, percentage to be calculated on the average of last three years' revenue.”

Mr. Eggleston seconded the motion.

Mr. Druce, in supporting the motion, said that the amount raised would be nearly £8,000 and considered that the funds would enable the Department to introduce pedigreed stock.

The Chairman said that the Department required highly scientific men, who would require that their salaries were properly provided for. The cost of the Department for last year was £7,000, whilst the return for the same period of £5,000 had been paid into the Treasury in cash.

The motion was carried.

“LEGAL” FENCE.—DEFINITION.

Mr. J. Sutton moved—

“That in the opinion of this Conference the matter of defining a ‘legal’ fence should receive the early consideration of the Government, with a view to dealing definitely therewith.”

Mr. Eascott seconded the motion.

Mr. Elliot considered the Act gave a sufficient definition at present.

After a number of delegates had spoken in favor of the motion, the Chairman said that when the question was before Parliament, it had been well threshed out by the Select Committee. It was then decided that a “legal” fence was one that would be sufficient to resist cattle and sheep. He understood the present resolution was to obtain a better definition than this.

The motion, on being put, was carried.

CO-OPERATION.

Mr. W. E. Ash moved—

“That in the opinion of this Conference a Union of Producers should be established with a view to bringing the producer into closer touch with the consumer and manufacturer.” He contended that the way in which produce was dealt with on the market was on a par with gambling with mining scrip. If the producers would only co-operate, they would better guard their interests, in that they would be able to deal directly with the consumer.

Mr. Solomon seconded the motion, in order, he said, to show how illogical the mover’s reasoning was. If it was to be logical, the producer of fruit or vegetables would have to go round with a barrow, or the farmer, with hay and chaff for sale, would have to take his produce round to stables. They could not get along without the middleman, any more than the manufacturer.

The Chairman thought they should consider the spirit rather than the wording of the resolution. He thought the mover advocated the co-operation of the producers, but the resolution, as framed, was liable to be misunderstood.

The motion was agreed to.

The Secretary for the Department of Agriculture announced that the rooms of the Department of Agriculture were always available for any meeting having for its object the furtherance of agricultural interests.

MIDLAND RAILWAY CONCESSION—OPENING UP.

Mr. J. Morrell moved—

“That in the opinion of this Conference, in the event of the Government failing to purchase the Midland Railway, the next best course would be to purchase large blocks of agricultural land along the line, and divide it up for selection.”

Mr. Halligan seconded the motion, which was supported by Messrs. Wilton, Brown and Elliot.

Mr. Elliot said that the general feeling among small owners was that the eyes of the country along the line were being picked out by persons with capital, who believed the concession was about to be taken over by the Government.

Mr. Druce pointed out that the main objection to this principle was the fact that the purchase of these blocks would increase the value of the other lands, and make it more difficult than now to repurchase.

The motion was carried.

STOCK ROUTES.

Mr. E. Warburton moved—

“That in the opinion of this Conference it is desirable that stock routes from distant centres to nearest railway stations should be surveyed and cleared of poison by Government.”

Mr. Warren seconded the motion, which was agreed to.

POISON PLANTS ON RESERVES.

Mr. E. Warburton moved—

“That in the opinion of this Conference it is desirable that all reserves should be cleared of poison plants.”

Mr. Stewart seconded the motion.

The Chairman thought that the best way would be to throw open the reserves for selection. (Hear, hear.)

The motion was carried.

NOTICES OF MOTIONS.

Mr. R. W. A. Warren moved—

“That in the opinion of this Conference the Government should adopt the policy of the Queensland authorities on the lines laid down by the Pastoral Leases Extensions Act, 1892-1898, of that State, to help pastoral lessees outside the South-West Division, to keep their runs free from the incursion of this pest.”

Seconded by Mr. Ash, and carried *nem con*.

Mr. S. R. L. Elliot moved—

“That in the opinion of this Conference the management of State Railways should be removed from political control or placed in the hands of a Commission.”

Seconded by Mr. Powell and carried.

CONCLUSION.

The business of the Conference having been concluded, the Chairman, in thanking the delegates for their attendance and the courtesy extended to him, expressed his gratification at finding the steady improvement which was noticeable in the tone of the debates at the Conference. If the same improvement continued they would form a body of which any country might be proud.

On the motion of Mr. Yelverton, a vote of thanks was accorded to the President (Mr. Chas. Harper, M.L.A.), the Secretary (Mr. L. Lindley Cowen), and the Officers of the Department.

ALLEGED CRUELTY TO A BULL.

GOVERNMENT OFFICIALS PROSECUTED FOR DISHORNING A BULL.

At the Perth City Police Court on Tuesday, March 26th, Robert Weir, Government Veterinary Surgeon, was charged with having dishorned a Jersey bull, belonging to the Government, and Alexander Crawford, Dairy Expert to the Department of Agriculture, was charged with having caused the act.

The prosecution was instituted by the Society for the Prevention of Cruelty to Animals, who were represented by Mr. Barlee. Mr. Northmore appeared for the accused.

William Mitchell deposed that he was a teamster and drover, and had had considerable experience with cattle. He was at Subiaco on the 18th, and saw the defendants. One of them was holding a bull, and the other was sawing the horns. He saw the operation commenced, but did not wait to see it through. They had the bull on its side, and the animal was struggling as if in pain. Blood was coming from the horn. There was wadding around the bulls head, apparently to stop the bleeding. His experience was that a bullock's horn was a most sensitive part. One could cut a bullock about with a whip, but it would not cause as much pain as a blow on the horn. He did not consider that such an operation was justifiable in any circumstances, not even if a bull had gored people to death. There were other ways of dealing with a dangerous bull.

To Mr. Northmore:—After the operation he saw that the wound had been dressed and treated in a proper manner. If a horn were growing into the eye he would cut the tips off the horn, but that would not affect the part that would cause pain.

Titus Lander, inspector of the Society for the Prevention of Cruelty to Animals, gave evidence as to his having seen the bull on Tuesday last. The horns had been cut off half an inch from the head.

To Mr. Northmore:—The Society had received reports about the dishorning of cattle.

Morton Craig, Chief Inspector of Stock, deposed that he approved of the practice of dishorning a bull when it was dangerous and gored people. Then it became a case of dishorning or destroying. There was no other remedy. Dishorning was undoubtedly a very cruel practice. He had seen it done with an instrument, and almost instantaneously. The discharge would often last for days. Sawing off a horn near the base would be a very painful operation. The practice of dishorning, he believed, was prevalent in the other colonies, among grown cattle. Queensland was the only colony in which he knew that the practice was carried out. He knew it was condemned in England.

Henry H. Edwards, veterinary surgeon, said that he had seen cattle dishorned. He had not done it himself. He had been

asked, and had refused to do such work. He thought that dishorning an animal caused excruciating pain, and involved cruelty. If a bull were dangerous he would not dishorn it. He had been asked to dishorn this particular animal and had refused to do so.

To Mr. Northmore:—He could not think of anything to justify dishorning. His father had been a veterinary surgeon. He would be very much surprised if it were proved that his father had dishorned any animal.

This closed the case for the prosecution.

Alexander Crawford, defendant, said that he was the Dairy Expert attached to the Agricultural Department. He had been connected for 35 years with cattle. He knew the bull which formed the subject of the present inquiry. It was the Government stud bull, and had been owned by the Government for three years. It was bought to lend to the farmers, with a view to improving the breed of cattle. When first purchased he was quiet, but after he had been let out he became vicious. About 18 months ago, at Greenough, he severely gored a Mr. Clinch. At the next place he was sent to he nearly killed another man. His horns were then tipped, and he remained as wicked as ever. The bull was sent a distance of 300 miles to Mr. Paterson, of the Agricultural Bank, who refused to take the animal unless he were dishorned. Witness thought that that was the only thing that could have been done. The operation was painful, but so was castration. He had seen thousands of cases of dehorning. He got Mr. Weir, the Government Veterinary Surgeon, to come down with him. They tied the bull up, and the actual dishorning was done by Mr. Weir. The time taken was about 20 seconds. After the operation the wounds were dressed. Five minutes after being dishorned the bull commenced eating. After this Mr. Paterson took the bull, upon which the operation had a most quietening effect. Three days afterwards there was no discharge from the wound.

To Mr. Barlee:—In England a bull was lead about, but that was not the practice in these colonies. The value of the bull was 100 guineas.

Robert Weir, co-defendant, gave evidence that he was Government Veterinary Surgeon. He knew the character of the bull, and approved of the dishorning. There was nothing else to do except to destroy the animal. The operation was performed in a careful manner, and the wounds were thoroughly dressed. The operation was painful, but necessary. The pain would last about 24 hours, but would gradually diminish from the time the operation was performed.

To Mr. Barlee: He differed from professor Whaller, the eminent veterinary surgeon in England, when he said that tipping was an infallible remedy for butting. He agreed that the general practice of dishorning was to be condemned. In this case the

operation was necessary, because the animal was dangerous. The operation was not performed to make the animal more useful to its owners.

Alexander Crawford, re-called, said that the operation of tipping had been performed after the animal had injured the men.

This completed the evidence, and cases of a similar nature were then cited by the respective counsel.

Mr. Roe said that he had quite made up his mind on the case, but as the counsel were so persistent in their desire for him to read certain cases, he would reserve his decision. He would say distinctly at this stage that in the present case he considered that the operation had been absolutely necessary. It was necessary either to kill the animal or to dishorn it. He would give his decision on the following day.

On the following day (Wednesday), Mr. A. S. Roe, P.M., gave his reserved decision. He said he was glad Mr. Barlee had been so persistent in his endeavors to induce him to look up certain cases. He had very carefully gone through the cases cited by Mr. Barlee and, after doing so, had come to a stronger conclusion than he had on the previous day. The cases showed distinctly that in England dishorning—or deborning (for both words seemed to be used)—appeared to be prevented in England as a general practice. The language of the judges, however, showed conclusively that under certain circumstances the operation could be performed without an offence being committed. The experts who had been examined in connection with the case referred to certainly said that dishorning was not justifiable under any circumstances. He was not, however, bound by the evidence of the experts, but had to lean more on what had been said by the judges. Mr. Justice Wighton had defined cruelty very clearly and strongly. That learned judge held that cruelty meant unnecessary abuse of the animal. Taking that definition as a guide, he found it impossible to come to any other conclusion in the present case but that no unnecessary cruelty had been practised. An extreme step had certainly been taken, and he had been pleased to note that the counsel for the defence had not pretended to uphold the practice of dishorning generally. It seemed to him, in the present case, that it had been either a case of dishorning or destroying. By dishorning, the life of the animal had been saved. This was a most important aspect of the affair. By saving the life of the bull, a great boon had been conferred on the farming portion of the community, and, indeed, on the colony as a whole. It meant the saving to the farmers of the services of a very valuable animal. The evidence showed that every precaution had been taken to prevent the animal suffering unnecessary pain. It was performed by the Government Veterinary Surgeon. Even the Inspector of Stock, who had been called for the prosecution, admitted that it had been a case either of dishorning or destroying. The case must be dismissed. He could not help saying that he considered the

prosecution had been unnecessary and ill-advised. Had the society inquired into the circumstances, the necessity for the operation would, he thought, have been seen.

Mr. Northmore said that he had been instructed not to ask for costs. The efforts of the society were, as a rule, to be appreciated, but in this case he thought they had acted in a misguided manner, and without making proper inquiries.

Mr. Roe said that was the view he took of the matter. He was glad that Mr. Northmore had not asked for costs. Mr. Barlee knew well that, whenever he could, he upheld the society, as he recognised it was doing good work. Speaking officially, he would say that he entirely exonerated the defendants from any blame in connection with the dishorning of the bull.

Mr. Northmore said that, to show that the Department of Agriculture bore no animus against the society for having instituted proceedings, he had been instructed by Mr. Lindley Cowen to hand to the society a cheque for £1 1s.

THE RABBIT PEST.

REPORT OF THE ROYAL COMMISSION.

SOME IMPORTANT RECOMMENDATIONS.

The report of the Royal Commission appointed some time ago to inquire into the rabbit question, to consider the best means of effectively dealing with the pest, and to devise some measure to stop the advance of the rodents into the settled portions of the State, was presented to His Excellency the Administrator some days ago. The Commission consisted of Messrs. R. Bush (chairman), Charles Harper, M.L.A., W. T. Loton, R. G. Burges, M.L.C., D. Forrest, M.L.A., A. R. Richardson, and F. Wittenoom, and the full text of their report is as follows:—

“Your Commissioners, appointed by His Excellency Sir Alexander Campbell Onslow, Knight, the late Administrator of the Government of this State, to inquire into the rabbit question, to consider the best means of effectually dealing with the rabbit plague, and to devise some measure to stop the advance of the rabbits into the settled portion of the State, having made careful and diligent inquiries, by the examination of witnesses and from all other available sources, beg to submit for Your Excellency’s information the following report:—

“ 1. They consider the following matters to be fully established from the evidence brought before them :—

“(a.) That rabbits in considerable numbers are, at the present time, in evidence in many places in Western Australia, and are frequently being discovered in fresh localities between the South Australian border and as far west as Coolgardie, and as far north as Broad Arrow.

“(b.) That, although in some of the localities, where they have only recently been noticed, they are as yet in no great numbers, they have at Eucla, and for some miles to the westward, increased to the extent of thousands, and, according to some evidence, to the extent of millions.

“(c.) That there is every reason to assume that rabbits will increase and multiply in this State to the same extent as they have done in other parts of Australia, there being nothing in the pasturage or conformation of the country to warrant any other conclusion. No false comfort should be derived from the fact that because in the past small isolated colonies of rabbits have not obtained a hold on the country, they will not do so, for it is an established fact (evidence of which we have taken) that in other parts of Australia the identical localities in which rabbits existed for many years without increasing, became afterwards hopelessly infested.

“(d.) That, owing to the apathy of the responsible authorities in the past, and their utter want of appreciation of the danger this State was incurring, through the ascertained progress of the rabbit invasion, your Commissioners are unfortunately compelled to advocate a fence, over 500 miles west of the boundary of the State, so that millions of acres of pastoral country will be left open to the ravages of the rabbits, and consequently lost to useful occupation. This national loss would, in all probability, have been obviated had steps been taken in reasonable time to check this incursion in its early stages.

“ 2. Your Commissioners are convinced that a properly constructed and well-maintained fence of wire netting, 42 in. wide, with a mesh of not less than $1\frac{1}{2}$ in., and not lighter than 17 gauge, B grade, with barbed and plain wires, is absolutely the only means of checking the incursion of rabbits. They advise that such a fence be erected well to the westward of the present known infested areas, starting from the Southern Ocean, in the vicinity of Fitzgerald Inlet, and extending northwards to the Indian Ocean, at La Grange Bay, subject to such deviations as experience and more detailed observation may suggest. Should the Kimberley districts be, in later years, threatened, a separate fence will have to be constructed. The evidence shows that there is nothing in the nature of the country, or its configuration, that offers any insurmountable

obstacle to the erection and efficient upkeep of such a fence. At first sight, the question of water no doubt presents difficulties, but there should be nothing in this connection beyond what ordinary bush intelligence and enterprise could cope with successfully. We estimate the cost of such a fence, as recommended, at from £55 to £70 per mile, according to locality, distance to cart, and other variable contingencies. Your Commissioners consider that, even should rabbits get through the fence, either by accident, or through the action of unprincipled people, the fence would in no way become a failure, because the few rabbits that did get through would find their natural enemies, and the artificial methods of extermination employed by the boundary riders, equal to the task of keeping them under.

"3. Your Commissioners suggest that the four hundred (400) miles of fence between Fitzgerald Inlet and Survey mark NB 49, be at once undertaken; and to ensure rapidity of construction, the contractor be bound to simultaneously start operations, with one party working north from the railway line, another party south from the railway line, a third party working north from Fitzgerald Inlet, and other parties from any other convenient starting points.

"4. Your Commissioners are of opinion that the making of rabbits or their skins a profitable article of commerce be condemned, and that the system of professional rabbiters and State subsidised bonuses is radically bad.

"5. Your Commissioners regret that they have had to leave much good land outside the proposed fence, and would suggest that settlers in those parts be assisted by Government to rabbit-proof fence their holdings, or groups of holdings.

"6. Your Commissioners recommend that a pamphlet, describing the most approved method of fencing, and the various means of extermination, be prepared for the guidance of occupiers of land.

"7. Your Commissioners strongly urge that communications be at once opened with the Pasteur Institute in Paris, with the object of obtaining a well-trained bacteriologist, competent to give a thorough trial as to the effect of chicken cholera, or any other disease on the rabbit; and, at the same time, investigate the cause of the extraordinary disappearance of the small marsupials in many parts of the State, with a view to ascertaining whether the disease which, presumably, caused such mortality, could be efficaciously applied to rabbits.

"8. Your Commissioners consider it expedient that a special officer under the Minister of Lands be appointed, who shall be directly responsible for the effective dealing with the rabbit pest.

"9. Your Commissioners desire to represent in the strongest manner, that the matter of checking this rabbit invasion is urgently important, and they suggest that all necessary material be at once ordered, and that all other requisite steps be immediately taken, to ensure the erection of the proposed fence without any delay; time being the essence of the whole matter."

BEE NOTES.

By A. CRAWFORD.

WATER SUPPLY.

In visiting some apiaries this past summer I was rather surprised to find that no provision had been made for supplying water. In one case the nearest open water that the bees could get at was distant about a mile. This want of provision means a considerable loss of honey, as the bees lose so much time in going to and from this water. The drier the district, the more water the bees require, and a good supply of fresh water should always be available near the hives. It may be given in many ways, but if left open and no means provided for getting out, many bees will be drowned. This year I tried hanging a water bag near the hives, and found it answer capitally. I covered the top of the water bag with muslin to keep the bees from getting in, as the amount of water getting through the canvas seemed ample. At times in the heat of the day the outside of the bag was simply covered with bees, whilst hundreds of others were flying about. Before they used to go to the lands that were supplied with a windmill, and hundreds got drowned. Since the bag came into use I scarcely found a bee from my hives in the lands, although there were still a good many others getting drowned, but as they were nearly all black bees or hyorids, they did not belong to me, as I had only Italians.

INTRODUCING QUEENS.

There are very many methods of introducing new queens into a hive. For expeditiousness and certainty of being accepted, I know of no method equal to that advocated by Mr. Simmins, and is described as follows by Mr. Cheshire: Remove the queen from the hive that is to receive the stranger, placing the latter at dusk in a cage quite alone and without food for thirty minutes. Then lift one corner of the quilt of the hive to which she is to be introduced, driving back the bees with a very little smoke, and at once permit the queen to run in. Close down the hive and make no examination for forty-eight hours, and leave the operation so late that a lamp is necessary when the queen is introduced. During the past season I have adopted the general plan of the above, with slight alteration. Instead of isolating the queen and keeping her without food, I have run her in direct from the queen cage with both bees, and food in it. Before introduction, I gave a good smoking at the entrance, and after two or three minutes let the queen run in. Out of over forty queens introduced by this method during the past season I have not had a single mishap, which is a much better result than I had hitherto obtained from any other way. By way of experiment I introduced three queens one after another, every third day into the same hive, and the bees accepted them freely. I may say that all the queens so introduced were laying queens. I have made no experiments with virgin queens, and so cannot say if they would be as well received.

CYPRIAN BEES.

It is now about fourteen years ago since I tried the Cyprian bee and I may state that the trial did not last long. I had been in London, and when there saw a hive of Cyprians and was much taken with their appearance. Resembling the Italian or Legurian they were rather smaller and more graceful in appearance, and much brighter in colour and appeared very active. I purchased a queen and successfully introduced her into a hive of Italians, and in course of time had a full hive of pure Cyprians, as the Queen was very prolific. In fact they were so numerous from that one hive that they seemed to take possession of the place. Just below the hive was a fine strawberry bed, which they evidently made up their minds to protect, and well they did it. If anyone went to gather strawberries, in less than a minute they were attacked and even when retreating, the bees followed up the attack right into the house. There was a public road about one hundred yards away, and it was nothing uncommon for the bees to attack the passers by. I remember well the first time I opened up the hive, I gave a few puffs of smoke and lifted a corner of the quilt, the moment I had done so about half a dozen flew out and stung me on the neck and face. I closed the quilt rapidly down, and gave a few vigorous puffs of smoke at the entrance, that was all, out they came, pouring like a flood of water, and before I could realize what had happened, I was one mass of stings, head, face, neck, arms and hands. I cleared as quickly as I could, and the next ten minutes were spent in emersing stings or getting them removed. I then got a cloth and saturated it with carbolic acid, and put it over the top of the frames, having protected myself with veil and gloves, the only time I ever wore the latter. This conquered them and I was able to handle freely. I found they were excellent workers, but great at building queen cells. I did not keep them long enough to test them properly, they were too vicious to have any pleasure in working and became a nuisance, so I destroyed them, and from reports I have seen of them since, they seem to have lost much of their savage disposition and are said to be quiet enough to handle, but after the one experience I have never tried them since.

THE SALE OF AGRICULTURAL SEEDS.

The Departmental Committee appointed by the Board of Agriculture, and presided over by the Earl of Onslow, to inquire into the conditions under which agricultural seeds are at present sold, has completed the report upon the subject. The Committee conclude that the seed trade in England is, on the whole, well conducted, and has of late years improved with the advance of science. Nevertheless, the majority of the committee recommend that one central station should be provided in the United Kingdom for the purpose of testing the purity and germinating power of seeds sent to it for official examination.

ORANGE AND LEMON CURING AND PACKING.

By A. DESPEISSIS.

Late in the autumn the attention of the grower is turned from his deciduous to his evergreen trees, of these, those which are of greatest importance to him are the trees of the citrus family.

As in the case of the deciduous trees which furnish the summer fruit crop, the choice of varieties to grow is made from a long list. In deciding what varieties to plant, several factors will influence the grower's choice, and, amongst others, the peculiarity of the local climate; the requirements of the market to supply; the character of the soil.

No climate is too warm for trees of the citrus tribe, provided that the parching effect of the torrid atmosphere is mitigated by a sufficiency of moisture in the ground. On the other hand, oranges, lemons and their like, cease to be profitable if grown in cooler climate better suited to the cultivation of pippins or of berries. A few strong trees may be found to thrive excellently under the conditions which prevail in such localities when sufficiently protected, but these are exceptions, from which it would be unwise to draw general deductions.

As regards the susceptibility of citrus trees to withstand hard frost, pomaloes and mandarins come first; they are followed by oranges and kumquats, lemons come next, with limes and citrons last on the list.

A description of each variety of these several species of citrus trees does not come within the scope of this chapter, and the information has already been given.

To the average West Australian grower, pomaloes, kumquats, citrons and limes are of as great account.

The first three are valuable for their peel, which is candied, whilst limes, and sometimes citrons, are more largely cultivated from the sake of the acid juice of their fruit. As odd trees only of these varieties are to be found in West Australian groves, all information referring to the manufacture of lime juice and to candied peel may well be left out. Mandarins, oranges and lemons are, therefore, of all citrus fruits, those which, having proved themselves well suited to the conditions of soil and climate of this country and to the requirements of our local as well as of our export markets, will be reviewed in the following paragraphs.

MANDARINS.

Of all our citrus fruits mandarins or tangerines are, for the purpose of the local market, the most valuable, the trees are hardy, they bear even when young heavy crops of fruit, they do not occupy much room in the orchard, being dwarf in comparison with other citrus trees. For this reason the crop is easily gathered, the trees are more easily sprayed and protected against the infestation of scale insects—that curse of our orange

groves—they are, besides, most delicious fruit, easily peeled, and greatly liked by everyone, young and old. Our market is at present badly supplied with this fruit, and as growers have, besides, for some unaccountable reason, been somewhat chary in planting them, it is quite unlikely that the demand will, for a long time to come, be satisfied. Nor can the Eastern States supply us with any large quantities of these fruits, as our mandarin season seems to be more protracted over here than it is in the east. Moreover, the fruit is not a very good carrier, the rind being puffy and the fruit tender, and on that account a heavy percentage of the shipments sent over here is lost to the importers.

In order to be profitable, the mandarin tree must be grown on the best of soils, deep, moist and fertile. Of varieties, the best in the order in which they ripen are Parker's Special, Thorny, Queen, Scarlet, Beauty of Glen Retreat and Emperor.

Mandarins can only carry when packed with the greatest care and attention, and when this is done with intelligence, the result is always satisfactory. They are best packed like figs, in shallow boxes, in layers of a dozen each for fruit of the first grade, and eighteen of the second grade, it is not advisable to have more than two such layers. Each mandarin should be wrapped in soft wrapping paper. Some packing houses have their trade mark and name printed on the paper, and as they use large quantities of that material, the extra cost is only nominal. If the mandarins are of especial quality and are meant for a select market, they are often wrapped in tin foil, and packed in neat boxes having an edging of lace paper, with an artistically colored design on the paper cover.

The fruit is, of course, as in the instance of oranges and lemons, carefully clipped and never pulled from the tree, it is allowed to sweat before packing and none but fruit free from blemish is ever packed.

ORANGES

Are of all the citrus fruit those most extensively planted in this State, where they thrive with great luxuriance. They require good soil, moist, but well drained, and wherever the best varieties are cultivated in congenial locations and are well fertilised, the West Australian oranges invariably supplant the imported fruit on the local market.

Thickness of the rind and sweetness of the juice, as well as abundance of crops, can, to a large extent, be influenced by manuring.

Heavy dressings of coarse farmyard or pig manure promote thick and puffy rind, and the growth of spongy wood tissue, particularly liable when under unfavourable circumstances to gumming and die-back diseases. Whenever the trees require a dressing of a nitrogenous fertiliser either nitrate of soda or sulphate of ammonia should be given the preference.

Potash fertilisers influence a thrifty growth, a healthy, deep color of both foliage and of rind, and a greater degree of sweetness.

For that purpose sulphate of potash, muriate of potash or kainit can be used. When using kainit the dressing should be more liberal than when either of the first two fertilisers are used.

Phosphates increase the productiveness of the trees, and the general excellence of the fruit. Either bone dust, phosphatic guano or 'Thomas' Phosphate give very good results. When it is intended to benefit more particularly the current season's crop, superphosphate of lime, which is more soluble than the other phosphatic fertilisers, applied in the late winter, or as late as the early spring, will be found most useful. Two to six lbs. of these fertilisers, according to the size of the trees, constitute a very good dressing.

Unlike lemons, which should be picked before they turn yellow, oranges are always better when left to hang until ripe and sweet. There is a degree of ripeness, however, which, if over-reached, proves detrimental to the long keeping of oranges.

Nothing but the best fruit, absolutely free from scale insects will carry and open satisfactorily when marketed. Fruit trees cannot carry a heavy crop and sustain large colonies of scale insects at the same time.

For picking the fruit some growers twist the stalk until it snaps; fruit thus plucked have a poor chance of keeping. Clippers that will not injure the fruit should be used in preference to a knife. The stalk is cut short, just above the star; if cut too long, it will probably puncture some of the fruit in the case and thus engender decay.

Some orchard hands when stripping a tree, place the fruit in a turned up apron fastened over their shoulders and round their loins; this plan is not to be recommended, as the fruit rolls about and thus gets more or less bruised; light buckets are most convenient for that work; they can be hanged until full to the step-ladder and then lowered and emptied in boxes with open slats and there left to sweat until packed for market. These boxes are filled so that one can be placed on the top of another without the oranges below being crushed by the case above.

If a spring cart is not available for conveying the fruit to the packing shed, and more especially if the road be rough and uneven, a bedding of straw in the bottom of the dray will save the fruit from being bruised. When freshly picked the rind of oranges and lemons is indeed brittle and its cells filled with moisture, essential oils and air.

After standing a few days, beads of sweat can be seen on the rind, which then becomes smoother, more pliable and leathery and less liable to be bruised by pressing in the case.

When properly sweated, which will take three to four days, the packer handles each fruit, wipes it dry and grades it according to size and quality. Fruit picked after heavy rain takes longer to sweat and is more easily bruised. It is then wrapped in a piece of tough but soft tissue paper, the four corners being gathered up at the stem end and twisted, thus acting as a spring buffer which saves the fruit around from possible bruises. The

paper should not be too large, and of course varies in size with the size of the fruit; the more common dimensions being 9 x 9 inches, 10 x 10 or 10 x 12 inches.

This done, each fruit is firmly set in its proper place in the case, tier upon tier. Should the last layer rise above the edges of the case, quarter of an inch or so, so much the better; the lid is placed on top and pressed down gently and firmly and nailed down. Oranges packed in this way, will not, when opened on sale, be found as several cases of otherwise choice fruits despatched last season to the Agent-General in London, to have "too much paper, be of mized size, and slackly packed," but they should carry in good condition even as ordinary cargo.

The cases should be made of light and well-seasoned wood, stowed away under shelter until used, so as to protect them from weather stains, and the name or trade mark of the grower, the grade of the fruit, and number in the case should be neatly stencilled on the end pieces.

Two defects should be guarded against with fruit cases, They should not be made of such wood as might impart to the contents an unpleasant flavour, and they should not be constructed of too flimsy material. When the slats are less than $\frac{1}{4}$ in. in thickness, and especially if these slats are wide, the cases are often damaged and go to pieces when slung in loading and unloading, and much fruit is in consequence injured or lost. A trifling saving may possibly be made in first cost of the thinner packages, and pounds' worth lost in the end on the consignment.

LEMONS.

A few notes on lemon curing will end this chapter. A number of new methods have been propounded for curing lemons by enthusiastic experimenters and the results have at times surpassed the most sanguine expectations, and at other times proved disastrous. When all is said and done, the only secret in the art of curing lemons consists of no more than careful handling.

Several desiderata, when found combined, ensure profit to the lemon grower, and unless these are secured there is no money in lemons, which are imported in large quantities from the Mediterranean ports in the height of summer, when they are most required, and sell at a comparatively low price.

The first of these is suitable soil and climate, then come suitable varieties, careful picking and handling, and long storing.

The best soil for lemons is a loose, deep, and well-drained loam, moist and fertile; it also does well on coarse granite soil, intermixed with a sediment of rich sand, but in these soils will require irrigation oftener than in the heavier soils.

Except in the more arid localities, irrigation is deprecated for the first two or three years, so as to force the tree to send its roots deeper into the soil in search of moisture and of nourishment. The wisdom of this treatment is made more apparent in the matter of both water and fertiliser in after years, when the trees

are in full bearing. Early irrigation also stimulates an already excessive tendency on the part of the lemon to make too rapid a growth of wood.

The cultivation amongst the lemon trees, as indeed amongst all citrus trees, should be frequent but shallow, as the roots are mostly surface feeders, and too deep cultivation would tear them to pieces.

A climate moist and warm suits the lemon best, as the tree is susceptible to hard frost, and loves moisture.

As to varieties, the list is a long one, but three or four stand out prominently, each having its advantages as well as its disadvantages, viz.: the Eureka, the Villa Franca, and the Lisbon. Of this last several strains are known, good, bad and indifferent, and every care should be taken, when propagating by buds, to ascertain the merits or the defects of the parent plant.

Picking is the essence of curing, and when lemons have been rightly picked, they will with ordinary care keep for a long period.

All lemons which have reached 3 to 4 inches in diameter, those that have already turned yellow, or show thorn pricks, those that have been punctured by scale insects, or are soiled by the sooty mould, are not fit for curing and long keeping, and should be sold to the best advantage and without delay.

The lemon tree blooms and sets its fruit continuously all the year round, although in the early spring and the late autumn more especially, the picking is heaviest. The tree it is known makes in favorable seasons several growths in the year, and likewise produces two main crops, with a few stray lemons in between.

For curing, the autumn pick of lemon is the best. This is done not all at once, but the trees are gone over several times, and the fruit picked as it reaches the right degree of development. At that time the skin is perfectly smooth and the end is filled out; before this time there seems to be a little depression or a little ring at the end. When this stage is reached the rind is thinner and less puffy than later on, the juice cells are tender and gorged with acid. The months May and June in Australia are the best for picking lemons for curing. The fruit should be picked when still green, with just a tinge of yellow showing. They should be stem cut and handled as carefully as has been mentioned in the case of the orange.

The sizes most suitable for the market are those ranging between $2\frac{1}{4}$ to 3 inches transverse diameter. Some people use a ring for the purpose of measuring the fruit, and every lemon that just goes through is clipped, the eye, however, soon gets trained to the size required, and when in doubt, the forefinger and the thumb round the lemon will, if they nearly meet at the stem, approximate the size wanted.

When picked, the lemons are placed in the sweat boxes, as described above when speaking of oranges, and there left for a week or so.

The size of the sweat box is of no special importance, but it should be shallow and not more than 9 to 10 inches deep, with a

few slits on the side to allow ventilation, and check the growth of the moulds of decay.

Packing is done when the skin is dry, clear and smooth. Several grades are made, each fruit is handled separately and none but those absolutely without blemish are wrapped in tough tissue paper and cased for long keeping.

When it is intended to store for a long period, the sorted and graded fruit may be placed on shallow trays superposed one on the top of the other in a cool, dark room, with sufficient ventilation provided to carry away the foul gases and the moisture thrown off the lemons. In this way they will keep through the winter until the approach of the warm weather in the early summer. A cool temperature is maintained in the room by opening the door and window at night, and closing them in the day time if found necessary.

Some packers place the fruit from the sweating boxes into barrels or large cases, and run over them fine dry sand and thus leave them until they are marketed when the demand sets in later in the year.

Other packers anoint each lemon with a light film of vaseline. For that purpose they rub the fruit all over with a piece of flannel with the vaseline on. It is claimed that vaseline never becomes rancid and is tasteless and odourless, and after a few weeks it is difficult to pick out the fruit that have been thus rubbed with vaseline, as by that time they have lost their oily and shining appearance. Vaseline checks the growth of moulds of decay and prevents the skin drying up too quickly. Some use steam for colouring the lemons, but the process is not to be recommended. Others dip their lemons in some antiseptic fluid and thus keep them sound for a long time, but lemons thus preserved, although bright and fresh when fresh from the dip, soon turn brown and show a horny rind.

In conclusion the art of curing lemons consists in :—

Growing the right kinds.

Manuring, cultivating and tending the trees well and maintaining them in a state of health and thrift.

Picking at the right time and in the proper manner as where the stem is pulled from the lemon the cells are exposed to the air and decay sets in.

Sweating and grading; storing in a cool, dark place. Specially constructed storing sheds have been constructed for keeping cured lemons in, but any ordinary chamber answers the purpose just as well, provided it is not damp or too much exposed to sudden changes of temperature. Such a chamber should be dark and well ventilated.

The lemons are marketed as are the oranges, and in connection with our local market it may be mentioned that the best months for handling the local crops are September and October, and before the November-cut main crop of Sicilians come in, and also in April and May, after the Sicilians are done, and before the cold winter sets in.

EXPERIMENTAL WORK.

The Secretary of the Department of Agriculture has received a report from Mr. Walter McKenna of Rushy Flat, Wagin Lake, as follows:—

“I now report to you *re* the potatoes you sent me for trial; I have delayed doing so to see how they would keep. I find ‘La Bella de Juillet,’ and ‘The General’ very good keepers. They ripened well in 12 weeks; ‘The General’ 13 weeks. ‘The General’ yielded 4 lbs. from the one tuber, none very large, owing to such a bad season, ‘Bella de Juillet’ yielded 6 lbs. of potatoes. The ‘Edgecote Purple’ yielded very badly, got second growth, but I will try the few I have again this season. Owing to the very dry summer the pumpkins all died, and the sorghum did no good, but is not dead. I planted a few of the mangolds in October, and they did very well. I shall plant the other seeds this year, and hope to report favourably then. I am well satisfied with the potatoes and mangolds.”

GARDEN NOTES FOR APRIL.

BY PERCY G. WICKEN.

By the time this is published we shall probably have had several good falls of rain, and the month will, therefore, be a busy one in the garden. Plants, which are now well established will soon make headway and will obtain a firm root hold before the spring. The land should not be worked when too wet, it is no easy matter to prepare saturated land for sowing, the land should, if possible, be well worked when dry and be ready to sow the seed after the first shower of rain. Where rain has not fallen the clearing up and burning off rubbish should be carried out as rapidly as possible. All manure laying about should be gathered up and put into a heap, so as to allow it to rot before putting into the ground. Farmers would do well to study draining a little more than they do, and during the wet weather to make note of the wet and boggy spots, so that they can be drained when opportunity offers. Land that has always been more or less of a swamp has been known when well drained to yield splendid crops. Land well drained and manured will, in almost any season, produce good crops, for the roots of the plants growing on such soil go well down into the soil, and are able to withstand the dry weather. After the first showers of rain, a crop of weeds will most likely spring up, and these should be cut down as soon as they appear, and then kept well stirred either by hand or the horse hoe.

BROAD BEANS.—This is the best time for sowing the main crop, they should be planted in rows 3 ft. to 4 ft. apart, and seeds should be 4 in. apart in the rows. Broad Windsor is one of the best varieties. The Dwarf Fan Bean is a good variety and very suitable for small gardens.

BEET (Silver and Red).—Thin out any plants that are coming up and keep the rows free from weeds.

BRUSSEL SPROUTS which are a sort of very small cabbage. A very good vegetable and deserve more attention at the hands of growers than they receive. A quantity of seed may be sown or any young plants that can be obtained may be put out.

CABBAGE.—Plant out as many plants as you are likely to require for your own use or for market. Select strong, healthy plants from the seed bed, and do not put out weak, spindly plants, as the resulting crop will not be healthy. The plants should be removed carefully from the seed bed and not pulled up, care should be taken not to injure the roots, and in planting out the roots should be put in straight, not doubled up, and the soil well pressed round them. Plant out seed beds for future requirements. A few red cabbages for pickling are also an addition to the list. Cabbages require plenty of manure, farmyard for preference. There are a great number of varieties, but Succession, East and West Ham, Wakefield, and the Drumhead, will be found among the best.

CAULIFLOWER.—If any plants are available they may be planted out, they require to be put in well manured land. Seed beds may be made for future planting. There is always a large demand for this vegetable.

CARROTS.—May be sown largely. Plant in rows 1 ft. apart, and do not cover the seed too deeply. Keep the rows well weeded and do not apply fresh manures, otherwise the roots will be forked and useless. The seeds take a long time to germinate.

LETTUCE.—Sow largely in seed beds and plant out any plants that may be fit.

ONIONS.—Sow largely of this plant, the soil requires to be well manured with well rotted stable manure and to have a very fine surface. "As fine as an onion bed" is a proverbial saying. They prefer a sandy loam soil well drained. As soon as the young plants are up they require weeding, as they are slow growing, and the weeds have a very damaging effect on the plants. Seed may either be sown in beds and planted out, or sown in drills in the field. The drills should be about 15 inches apart, and the plants thinned to 4 inches apart in the drills.

PEAS.—This is a good month to sow a quantity of this favorite vegetable. They should be sown in drills 3 ft. apart, and about 3 inches apart in the drill, and covered with 2 inches of soil. The dwarf varieties may be sown closer together. Peas can do with plenty of lime. Potash and superphosphate are the manures to use. Nitrogenous manures are not required.

TURNIPS.—Should now be getting a fair size, and will require to be thinned out and kept free from weeds. Further supplies may be planted where required.

FARM.—Operations on the farm are now fairly slack, the chief operation being ploughing and preparing the land for the coming cereal crop. Wherever ploughing is practical it should be pushed

forward, and where the ground is too hard, everything should be got in order for an early start. The late rain will allow operations to be started over a large area of country. Early sown crops generally give much the best results, as the crops are able to mature before the really dry weather sets in. Where haystacks are to be kept through the winter, they will require to be thatched, otherwise the damage by wet may be considerable. Chaff and grain had better be all carted before the roads become heavy with the wet, and the horses are required for ploughing.

ANSWERS TO CORRESPONDENTS.

"Wyandotte," Leederville, writes :—"I have a Minorca cockerel with a good comb, but recently it has become shrivelled up. Can you tell me the cause? The bird otherwise is in the best of health and plumage." The matter being referred to the Dairy Expert, Mr. Crawford replies :—"Unless the conditions and surroundings were known it would be utterly impossible to give the cause. As a remedy, wash the comb well with luke warm water, work it well with the fingers, then rub a little olive oil well in daily. An occasional washing with dilute vinegar will also help."

Mr. R. B. Leake, of Moranoppin, writes :—"I have sought for a skigger for raisins in vain. Could you kindly inform me if one can be got in Perth, if not, if one would be difficult to make. Regret I was not more explicit, and so saved you the trouble of writing. By the skigger I mean a machine for taking the stalks off the raisins." The matter being referred to the Viticultural Expert, Mr. Despeissis replies :—"I have written to Melbourne to enquire whether a small sized stemmer, run by hand, can be procured, either at Mildura or Melbourne. There are large stemmers and graders at both Mildura and Renmark, where all the work is done in central packing houses. The principle on which they work is that the dry stems are separated by revolving the raisins rapidly in a drum of galvanised iron, or of strong galvanised wire. Underneath this drum are sets of trays shaking automatically and likewise perforated, through which the smaller berries fall, whilst a blast of air, created by a fan, blows away dust and broken stems. As a makeshift, where only small quantities of raisins are made, an ordinary tray, made of strong wire netting fastened to a frame, could be used, the raisins being rubbed over it by hand. One matter of importance, whatever style of appliance is used, is that the stems should be sufficiently dry to break off easily, otherwise the raisins will not readily separate from the stems, or if they do they will tear, and will soon deteriorate owing to the action of the air on the sweet pulp of the dried berries."

Mr. J. Dean Hammond, Beverley, writes :—"I beg to report on growth of sorghum seed supplied by you for experimental purposes. This was sown in October, as I before informed you, on poor land, newly cleared and turned up, without any manure. This I consider a hard test, but any crop that requires pampering will not do for W.A. The growth is very good, I consider, varying from 3 to 5 ft. in height. I have grown it 8 ft. high on rich land, but consider this a better test. I find cattle and pigs are very fond of it, also horses. It is more easily managed than any other crop because it can be sown at a slack time when fallowing is over. The benefits to be derived from a green forage crop during the hot months of February and March are incalculable. Thanking you for supplying the seed, the result of the growth of which I am well satisfied with." The matter was referred to the Field Officer of the Department, and Mr. Wicken replies :—"I am pleased to hear that the sorghum has turned out so well. It is one of the best drought restraint crops known; it will grow and often flourish where a maize crop would utterly fail;

it can be sown at a slack time of the year, and will often yield a good supply of fodder if sown on stubble land. The crop also comes in at a convenient time, when green feed is very scarce. We hope to carry out further experiments in this direction in the near future on an experimental farm of our own."

Mr. A. R. Richardson, Serpentine, writes, calling attention to grass known as *Danthonia semiannularis* or wallaby grass, and asking to be supplied with seed. This letter was submitted to the Government Botanist, who reports as follows:—" *Danthonia semiannularis* is a native of all the States, and is a good hardy grass, in best condition for grazing in spring. There are several species of *Danthonia* known as wallaby grass, though Baron von Mueller puts five of them (including *semiannularis*) into one named *Danthonia penicillata*. Seed of the native grasses, with the exception of Mitchell grass, is not included in seedmen's lists, so that it does not seem procurable in the ordinary way of trade." Mr. P. Wicken, of the Department of Agriculture, also reports having grown this grass with satisfactory results in New South Wales, and says it is hardy, a prolific seed, and quick growing, and although it is rather wiry, stock will eat it readily, whilst it is also a good drought resister.

Mr. P. Ischerner, of Spearwood, writes:—"Herewith I am sending by post a sample of the brown millet grown by me from the seed obtained from you last season. I planted the 140 seed in two rows six inches apart, well trenched. The shoots showed above the ground in a week. Unfortunately the magpies eat off the first leaf, but the plant soon grew, and in three weeks time it stood 2 ft. high, with a good number of shoots on. I cut all off excepting two or three of the strongest. The plants rapidly grow to between 5 and 6 ft. high, when they stopped and the brush commenced to form. I cut back the upper of the leaf round the brush, which soon showed itself very fine, which began to ripen about the middle of December. The plants required a very great deal of water; it grew well in sand about 10 ft. from water; the tallest plants yielded the best brushes. I am very pleased with the result, and shall try again on a larger scale next season if there is likely to be any commercial value in it." To which Mr. Wicken, Field Officer of the Department, adds:—"There is a good demand for brown millet for brush making, and it should prove a profitable crop. It is hardy, and stands the dry weather. The heads are worth about £30 per ton, and the seed 4s. 6d. per bushel. The lower part of the stem can either be made into ensilage or else ploughed into the ground as manure for next crop. I am pleased to see it grown here, and hope Mr. Ischerner will try an extended area next year. If Mr. Ischerner has any of the millet heads for sale, Messrs. Albrecht & Co., of East Fremantle, would be open to buy any quantity if it is of suitable quality."

MARKET REPORT.

FOR MONTH ENDING APRIL 10.

The West Australian General Produce Company report sales effected for the following articles for the month ending April 10th:—Business for the last month slight improvement and every indication of continuing so. Country consignments not quite so numerous, and likely to have further diminution in that respect, owing to the recent welcome rains. The farmers undoubtedly will be busy ploughing. Bacon—absolutely outstocked, and next lot to arrive in the s.s. Buninyong about Friday next, practically all booked forward delivery. Hams—also very scarce, expect another consignment during early part next week. Hutton's. Butter—values still unsettled, New Zealand lots on the Melbourne market tend to slightly check exorbitant prices which would have taken place. Cheese—fairly good demand. Eggs—local, fresh, have been in splendid demand, realising high prices. Potatoes—imported, still heavy stocks on spot. Onions in better demand. Chaff—supplies likely to

be short in a few days, farmers will be unable to deliver owing to ploughing. Bran and Pollard—no material alteration. Flour—local selling well. Oats—good demand setting in for Algerian seed, of which we have a large consignment, the best ever imported and grown in the colony, yielding average 40 bushels to the acre last season. Wheat—no change to record. Oil cake—every day that passes finds new adherents for stock, poultry, pigs, etc., feeding. Fruit—very short supplies, and apples pears and grapes in great request. Vegetables—continue finding good outlet, and in particular sound cabbage, pumpkins, carrots, parsnips, etc., salads also in good demand. Poultry—great numbers arriving of late, and in consequence prices fell fully 30 per cent., also very hard to dispose of anything but the best table sorts, advise senders to slacken off for a while. Game—now the weather has settled cool, would arrive fresh, and find good outlet. Carcase meat—finds regular good outlet if—from 50 lb. to 70 lb.—cleanly dressed. Artificial manures—the season has practically commenced and several orders have been executed and others coming forward. Second-hand bags—in good demand.

Farm and Dairy Produce.—Bacon—sides, worth 11d to 11½d per lb. Hams—Hutton's 1s 2½d to 1s 3d per lb. Butter—Victorian, 1s 5d to 1s 6d per lb. New Zealand to arrive, 1s 4d per lb. Lard—in tins, 1 lb and 2 lb, patent lids, 9d per lb; 4 lb, patent lids, 8½d per lb. Cheese—mediums, 8½d to 9d per lb; loaf, 9d to 9½d per lb. Eggs—local, fresh, 2s 4d to 2s 6d per doz; few new laid up to 2s 9d per dozen. Potatoes—imported, £8 to £9 per ton. Onions—11s 6d to 12s per cwt. Chaff, worth £4 10s to £5 per ton. Hay—oaten, £5 10s per ton. Straw—oaten, £3 10 to £4 per ton. Bran—£6 10s to £6 15s per ton. Pollard—£6 15s to £7 per ton. Flour—local sacks, £9 5s per ton; quarter, £9 10s per ton. Oats—wheaten feed, 3s to 3s 6d per bushel; Algerian seed, 3s 6d to 4s 2d per bushel. Maize, feed, 6s 5d per bushel. Wheat—4s 3d to 4s 6d per bushel. Oil cake—£7 per ton; 7s 6d per cwt. Peas—dry, Prussian blue, 6s 6d to 7s per bushel.

Fruit.—Oranges—Italian, 22s 6d per case. Lemons—Italian, from 8s, 10s, 12s, to 14s per case. Bananas expected to arrive per Wollowra. Grapes—muscatels, 10s to 14s per case; dorradilo, 10s to 30s per case; Wortley Hall, 15s to 17s 6d per case. Peaches—dessert, 10s to 20s per case; cooking 7s to 10s per case. Plums—imported, 6s 6d per quarter case. Apples—dessert, from 14s to 26s per case; cooking, from 10s to 12s per case. Pears—dessert, worth 14s to 25s per case; cooking, 7s to 10s per case. Quinces— from 5s to 6s per case. Pomegranates—1s to 1s 6d per dozen. Melons—rock, 2s to 4s per dozen.

Vegetables.—Cabbage—from 7s to 13s per cwt. Carrots and parsnips—1s 6d to 1s 9d per dozen bunches. Turnips—white, 1s 6d to 1s 9d per dozen bunches. Beans—worth 3d per lb. Marrows and pumpkins—6s to 6s 6d per cwt. Rhubarb—worth 2d to 3d per lb. Capsicums and chillies, 4d to 6d per lb.

Salads and Herbs.—Lettuce—worth 8d per dozen. Spring onions—worth 8d per dozen bunches. Beetroot—worth 2s 6d per dozen bunches. Tomatoes—5s to 6s per case, scarce. Celery—worth 2s per dozen bunches. Cress—worth 6d per dozen bunches. Thyme, marjorum, sage—off stalk, 9d per lb. Mint—off stalk, 6d per lb.

Poultry.—Fowls—prime table, 4s 6d to 5s per pair; others, from 3s 6d to 4s per pair. Chickens—from 2s to 3s per pair. Ducks, from 4s 6d to 5s per pair. Geese—from 8s to 10s per pair. Turkeys—gobblers, from 16s to 22s 6d per pair; hens, from 14s to 15s per pair.

Game.—Black Duck—worth 4s 6d per pair. Teale—worth 3s 6d per pair. Hardhead—worth 3s 6d per pair. Bluewing—worth 3s per pair. Mountain Duck—worth 5s per pair.

Carcase Meat.—Pork—50lb. to 70lb., 6d to 6½d per lb.

Sundries.—Bonedust—on truck, Northam, £6 12s 6d per ton; from £7 to £7 10s per ton. Phosphate—£4 10s per ton. Superphosphate—£6 10s per ton. Live guano—£5 10s per ton. Dead guano—£3 10s per ton. Coarse bacon salt—£3 10s per ton. New corn sacks—7s 3d; second-hand, 4s 6d per dozen. New bran bags—4s 7d; second-hand, 3s 6d per dozen.

THE CLIMATE OF WESTERN AUSTRALIA DURING MARCH, 1901.

Taken as a whole, the weather at Perth was about an average, the mean maximum day temperature at the Gardens being 83·9, against an average of 84·7, and the mean minimum night temperature 60·8, against 60·9.

During the first half of the month a few warm days were experienced, but the temperature never once reached 100 degrees, the highest being 99·8.

After the 24th, however, a sudden change occurred, and weather of almost a wintry type prevailed, moderately heavy rain falling on the 25th and 26th, and on the three following nights dew was recorded. The mean pressure was also about an average.

The climate maps for the State show that over the Murchison and Coolgardie Goldfields the mean maximum day temperature was from three to four degrees below the average, but it must be taken into consideration that records for three or four years only are available.

The night temperatures were slightly below the average.

In the S.W. and S. districts moderate weather prevailed, one or two hot days were felt, Albany recording 98·9 on the 6th, which is a record for that place for March, the highest for previous years being 96. The thermometer at Breaksea on the same day read 93, and at Eyre the highest was 101·2. During the month some cold nights were experienced, Bridgetown registering 35 degrees, Collie being next with 39·6. In the N.W. and tropics the rainfall was about normal, but between Condon and Port Hedland it was much above.

Over the Murchison the rainfall was in excess, but on the Coolgardie Fields below the average. In the S.W. and S. rain was heavier than usual, but most of it fell during the last week of the month.

We may consider that the summer is now drawing to a close, and during the month of April a fall of temperature from 4 degrees to 10 degrees may be expected throughout the State.

THE CLIMATE OF WESTERN AUSTRALIA DURING MARCH, 1901.

Locality.	Barometer (corrected and reduced to sea level).			Shade Temperature.				Average for Previous Years.			Rainfall.	
	Mean of 9 a.m. and 3 p.m.	High. est.	Low. est.	March 1901.				Mean Max.	Mean Min.	Highest ever recorded.	Lowest ever recorded.	Total points (100 to inch) since month, Jan. 1.
				Mean Max.	Mean Min.	Mean of Month.	Highest Max.					
Wyndham	29.811	29.804	30.014	29.641	95.6	77.6	101.2	73.0	98.2	79.4	120.0	402
Darby	82.4	828	—	661	97.3	76.8	87.0	70.0	95.8	76.2	109.0	103
Broome	830	793	29.995	669	93.2	70.0	100.5	66.5	92.5	76.1	103.0	349
Condon	861	801	30.091	736	—	—	—	—	93.4	75.2	103.8	942
Cossack	878	804	0.35	724	93.7	76.2	102.3	69.0	96.2	77.2	113.0	234
Onslow	845	864	0.26	674	93.6	73.3	102.0	66.0	96.9	71.6	115.0	55
Carnarvon	900	886	1.35	748	90.5	71.6	105.6	61.1	90.4	68.4	112.0	152
Hamelin Pool	912	836	1.29	765	94.2	69.4	105.0	54.2	95.5	66.8	112.8	16
Geraldton	953	979	1.87	780	86.6	64.0	101.0	51.0	83.7	63.1	109.0	62
Hall's Creek	891	—	0.73	696	91.9	69.9	98.0	56.4	—	—	—	455
Marble Bar	—	—	—	—	96.4	73.8	85.1	66.4	—	—	—	1204
Nullagine	866	—	0.96	726	91.4	69.6	99.5	64.0	—	—	—	663
Peak Hill	904	—	1.18	748	88.4	68.1	97.7	58.8	—	—	—	1531
Cue	944	868	1.77	750	89.8	65.5	100.0	54.1	96.3	66.9	108.2	95
Yalgoo	935	890	1.51	742	89.6	65.3	100.6	52.1	93.1	64.8	107.7	129
Lawlers	906	—	2.59	708	84.1	63.9	97.6	54.1	—	—	—	115
Laverton	30.029	—	2.91	780	84.2	59.9	99.0	53.6	—	—	—	27
Menzies	004	936	3.18	746	84.2	59.5	96.4	52.9	89.1	62.0	105.0	15
Kalgoorlie	034	973	3.52	719	83.5	59.2	96.8	47.5	86.4	60.3	104.0	5
Coolgardie	024	—	3.36	696	83.6	57.5	96.8	49.5	87.3	59.0	104.2	2
												4

The figures for previous years have been given whenever there are at least three years' complete records. This number is a very low one which to base averages, but otherwise the Goldfields would be excluded.

THE CLIMATE OF WESTERN AUSTRALIA DURING MARCH, 1901.—Continued.

Locality.	Barometer (corrected and reduced to sea level.)				Shade Temperature.				Average for Previous Years.				Rainfall.			
					March 1901.											
	Mean of 9 a.m. and 3 p.m.	Average for previous years.	High-est.	Low-est.	Mean Max.	Mean Min.	Mean of Month.	Highest Max.	Lowest Max.	Mean Max.	Mean Min.	Highest ever recorded.	Lowest ever recorded.	Points (100 to 1-inch) in month.	Total points since Jan. 1.	
Southern Cross	...	29.994	.951	.260	.708	86.4	57.0	71.7	96.0	44.0	88.0	57.3	106.0	40.0	45	84
York	...	30.013	30.016	.285	.664	84.3	55.4	69.8	98.0	47.5	84.1	59.7	107.0	41.0	135	143
Guildford	86.0	58.1	72.0	101.2	46.5	—	—	—	—	195	204
Perth Gardens018	.024	.281	.682	83.9	60.8	72.4	99.8	52.0	84.7	60.9	106.2	45.0	149	161
Perth Observatory026	29.987	.285	.678	81.6	61.1	71.4	98.7	51.1	81.5	61.2	101.8	46.0	159	173
Fremantle015	30.006	.259	.658	79.7	62.7	71.2	91.5	53.6	80.1	62.3	105.0	48.0	173	180
Rottnest	...	29.976	29.977	.264	.645	75.7	63.4	69.6	94.2	56.4	78.9	61.7	101.0	51.0	115	123
Mandurah	81.4	57.2	69.3	93.6	44.8	—	—	—	—	125	149
Collie	80.1	48.9	64.5	95.8	39.6	—	—	—	—	113	124
Bunbury	...	30.044	30.038	.335	.664	78.3	55.6	67.0	93.2	46.3	77.5	57.7	97.0	41.0	249	283
Busselton	77.2	53.9	65.6	88.0	44.0	—	—	—	—	277	293
Bridgetown	79.9	47.1	63.5	98.0	35.0	—	—	—	—	144	169
Karridale056	.019	.355	.652	72.8	55.1	64.0	94.2	45.8	75.5	55.3	101.5	43.8	218	279
Cape Leewardin014	29.992	.393	.627	70.4	60.6	65.5	88.5	53.5	72.0	61.6	91.0	54.0	139	188
Katanning008	.991	.346	.580	79.1	51.9	65.5	96.0	55.5	80.3	53.0	103.0	39.0	137	224
Albany078	30.085	.390	.650	72.7	55.6	64.2	98.9	47.6	70.3	58.2	98.0	41.0	188	283
Breaksea063	—	.392	.641	66.0	59.0	62.5	93.0	47.0	69.1	59.2	90.5	52.0	128	170
Esperance070	.086	.358	.616	77.4	58.2	67.8	95.8	43.8	76.3	58.1	101.4	41.0	86	279
Eyre057	—	.284	.647	77.9	57.1	67.5	101.2	42.0	—	—	—	—	36	215

The figures for previous years have been given whenever there are at least three years' complete records. This number is a very low one upon which to base averages, but otherwise the Goldfields would be excluded.

THE OBSERVATORY, PERTH, 10th April, 1901.

W. E. COOKE. *Government Astronomer.*

RAINFALL for Feb., 1901 (completed as far as possible),
and for March, 1901 (principally from Telegraphic Reports).

STATIONS.	FEB.		MAR.		STATIONS.	FEB.		MAR.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
EAST KIMBERLEY:					N'TH-WEST—Cont.				
Wyndham ..	424	..	402	..	Tambrey ..	..	..	..	..
6-Mile ..	414	10	455	..	Millstream ..	320	5	..	..
Carlton ..	..	..	..	..	Mallina ..	801	4	..	..
Denham ..	..	..	..	..	Whim Creek ..	897	5	324	6
Rosewood Downs ..	..	..	..	..	Cooyapooya ..	355	6	..	..
Argyle Downs ..	..	..	..	..	Woodbroke ..	391	4	..	..
Lisadell ..	..	..	..	..	Croydon ..	505	4	..	..
Turkey Creek ..	1296	15	575	14	Balla Balla ..	747	5	368	7
Ord River ..	724	..	458	..	Roebourne ..	341	5	295	6
Koojubrin ..	..	..	..	..	Cossack ..	421	7	234	5
Hall's Creek ..	857	..	455	..	Fortescue ..	66	5	121	4
Flora Valley ..	..	..	..	..	Mardie ..	25	1	..	..
Ruby Creek ..	..	..	..	..	Mt. Stewart ..	140	3	..	..
Denison Downs ..	1595	..	..	..	Yarraloola ..	14	1	..	..
					Chinginarra ..	Nil	..	..	..
WEST KIMBERLEY:					Peedamullah ..	111	3	..	..
Obagama ..	..	..	..	..	Onslow ..	73	4	55	2
Derby ..	331	..	193	..	Red Hill ..	226	3	..	..
Yeeda ..	..	..	..	..	Mt. Mortimer ..	9	1	..	..
Liveringa ..	..	..	..	..	Wogoola ..	241	3	..	..
Mt. Anderson ..	..	..	..	..	Nanutarra ..	42	2	..	..
Leopold Downs ..	..	..	..	..	Yanrey ..	250	2	..	..
Fitzroy Crossing ..	998	19	216	8	Point Cloates ..	..	..	286	..
Quanbun ..	..	..	..	..	GASCOYNE:				
Nookanbah ..	..	..	..	..	Winning Pool ..	129	2	305	6
Broome ..	812	15	349	9	Towara ..	116	3	..	..
Thangoo ..	..	..	..	..	Ullawarra ..	119	5	..	..
La Grange Bay ..	1395	17	251	8	Woorakdjia ..	358	2	..	..
					Bangemall ..	79	2	..	..
NORTH-WEST:					Minnie Creek ..	66	2	..	..
Wallal ..	877	13	595	9	Yanyearreddy ..	39	2	..	..
Condon ..	1028	..	942	..	Carnarvon ..	Nil	..	152	..
DeGrey River ..	725	7	..	..	Doorawarra ..	23	1	..	..
Port Hedland ..	1432	7	648	6	Mungarra ..	29	3	..	..
Boodarie ..	..	..	..	..	Clifton Downs ..	11	2	..	..
Yule River ..	1179	6	..	..	Dairy Creek ..	Nil	..	..	..
Warralong ..	618	9	..	..	Errivilla ..	30	1	..	..
Muccan ..	458	9	..	..	Sharks Bay ..	Nil	..	30	1
Mulgie ..	1023	12	..	..	Kararang ..	Nil	..	..	..
Eel Creek ..	..	..	..	..	Meedo ..	9	1	Nil	..
Coongon ..	395	6	..	..	Wooramel ..	Nil	..	31	2
Warrawagine ..	..	..	..	..	Hamelin Pool ..	Nil	..	16	2
Bamboo Creek ..	709	9	362	6	Byro ..	19	2	..	..
Marble Bar ..	584	10	413	9	Peak Hill ..	336	6	95	..
Warrawoona ..	520	8	635	9	Abbotts ..	301	4	184	5
Corunna Downs ..	522	10	..	..	Belele ..	295	2	..	..
Nullagine ..	452	7	663	..	Mileura ..	62	..	..	..
Tambourah ..	590	6	387	10	Milly Milly ..	Nil	..	..	..
Roy Hill ..	..	..	..	..	Manfred ..	Nil	..	..	..
Woodstock ..	747	9	..	..	Meelya ..	Nil	..	..	..

RAINFALL.—Continued.

STATIONS.	FEB.		MAR.		STATIONS.	FEB.		MAR.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
GASCOYNE—Cont.					S.W. DIV.—Cont.				
Woogarang ..	Nil	..	44	2	Belvoir ..	Nil	..	175	4
Billabulong ..	Nil	..	..	..	Guildford ..	6	3	195	7
Wooleane ..	Nil	..	..	..	Kallayamba ..	Nil	..	149	5
Meka ..	21	1	132	7	Can'ing W'works ..	Nil	..	200	6
Mt. Wittenoom ..	18	3	..	..	Perth Gardens ..	1	1	149	7
Nannine ..	271	4	..	..	„ Observatory ..	1	1	159	7
Star of the East ..	291	2	197	5	Subiaco ..	Nil	..	157	6
Annean ..	..	..	118	3	Claremont ..	Nil	..	132	5
Tuckanarra ..	239	3	288	6	Armadales ..	..	..	150	5
Coodardy ..	130	1	..	..	Fremantle ..	3	2	173	7
Cue ..	152	3	129	5	Rottneet ..	8	3	115	7
Day Dawn ..	141	2	166	4	Rockingham ..	Nil	..	179	4
Lake Austin ..	108	2	256	4	Jarrahdale ..	5	1	206	4
Lennonville ..	153	3	246	4	Mandurah ..	1	1	125	3
Mt. Magnet ..	166	3	174	4	Pinjarrah ..	Nil	..	157	4
Challa ..	136	3	..	..	Harvey ..	4	1	170	4
Youeragabbie ..	61	5	..	..	SOUTH-WEST, CENTRAL PART (INLAND):				
Murrum ..	35	2	..	..	Momberkine ..	10	1	112	3
Yalgoo ..	7	..	115	..	Culham ..	25	4	79	5
Gabyon ..	Nil	..	154	2	Newcastle ..	Nil	..	51	4
Gullewa ..	Nil	..	122	4	Eumalga ..	10	4	73	5
SOUTH-WEST DIVISION (N'N PART):					Northam ..	5	2	99	5
Mur. House ..	Nil	..	..	..	Grass Valley ..	16	3	96	4
Mt. View ..	8	3	86	6	Meckering ..	14	3	155	4
Yuin ..	Nil	..	105	3	Doongin ..	11	1	..	..
Northampton ..	5	2	100	6	Whitehaven ..	30	1	129	4
Mt. Erin ..	36	3	154	5	Sunset Hill ..	27	2	86	5
Tibradden ..	6	3	150	5	Cobham ..	17	3	141	6
Mullewa ..	Nil	..	99	4	York ..	7	4	135	..
Bootenal ..	42	2	126	5	Beverley ..	Nil	..	132	3
Geraldton ..	18	3	62	..	Barrington ..	21	2	..	..
Greenough ..	3	1	125	6	Sunning Hill ..	10	1	74	2
Dongara ..	6	1	25	5	Wandering ..	2	1	132	4
Dongara (Pearse) ..	6	1	27	3	Pingelly ..	15	1	87	3
Strawberry ..	Nil	..	..	..	Marradong ..	1	1	162	4
Minginev ..	17	3	302	7	Bannister ..	7	1	151	4
Field's Find ..	36	1	46	3	Narrogin ..	70	2	106	4
Carnamah ..	19	2	215	3	Wickepin ..	13	3	107	3
Watheroo ..	7	1	88	5	SOUTH-WEST DIVISION (S'N PART):				
Dandaragan ..	44	4	130	6	Bunbury ..	9	3	249	5
Moora ..	6	2	109	5	Collie ..	Nil	..	..	..
Yatheroo ..	23	2	163	5	Salvation Army Settlement ..	1	1	116	4
Walebing ..	5	1	141	6	Glen Mervyn ..	13	3	..	..
New Norcia ..	18	1	102	7	Dardanup ..	Nil	..	177	6
SOUTH-WEST DIVISION, CENTRAL (COASTAL):					Donnybrook ..	4	2	197	4
Gingin ..	11	3	183	5	Boyanup ..	3	1	185	5

RAINFALL.—Continued.

STATIONS.	FEB.		MAR.		STATIONS.	FEB.		MAR.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
SOUTH-WEST—Cont.					EASTERN DIV.—Cont.				
Busselton ..	6	4	277	7	Mt. Morgans ..	385	5	14	1
Quindalup ..	4	3	155	7	Laverton ..	404	7	15	..
Margaret River..	30	1	..	..	Murrin Murrin ..	262	6	12	4
Lower Blackwood	19	2	244	8	The Granites ..	250	2	Nil	..
Karridale ..	34	3	218	10	Tampa ..	269	3	41	2
Augusta ..	27	3	188	11	Niagara ..	228	4	23	2
Cape Leeuwin ..	18	5	139	12	Yerilla ..	324	6	29	2
Riddellia ..	41	3	214	5	Edjudina ..	330	5	..	..
The Warren ..	23	4	221	7	Menzies ..	378	4	5	1
Lake Muir ..	43	4	..	..	Mulline ..	234	5	13	1
Mordalup ..	17	5	179	5	Goongarrie ..	375	6	Nil	..
Deeside ..	56	3	..	..	Kurawa ..	312	3	4	2
Riverside ..	56	5	..	..	Dixie Gold Mine	221	7	3	1
Balbarup ..	46	4	237	8	Kurnalpi ..	279	6	Nil	..
Wilgerup ..	..	2	172	7	Butong ..	473	6	1	1
Mandalup ..	14	1	136	4	Kanowna ..	220	6	2	1
Bridgetown ..	10	3	144	6	Kalgoorlie ..	262	4	2	1
Greenbushes ..	16	2	166	4	Coolgardie ..	250	5	4	2
Williams ..	Nil	..	170	4	Burbanks ..	157	4	3	1
Arthur ..	Nil	..	101	4	Londonderry ..	176	3	Nil	..
Darkan ..	Nil	..	..	..	Woolubar ..	248	6	16	1
Wagin ..	180	2	144	4	Widgiemooltha ..	210	2	4	1
Glencove ..	31	2	123	4	50-Mile Tank ..	255	3	10	1
Dyiliabing ..	21	1	131	5	Norseman ..	195	3	30	1
Katanning ..	80	1	137	..	Bulla Bulling ..	138	..	Nil	..
Kojonup ..	Nil	..	96	4	Woolgangie ..	133	3	24	2
Broomehill ..	8	1	128	3	Boorabbin ..	123	3	30	3
Sunnyside ..	8	1	120	3	Karalee ..	81	3	55	2
Woodyarrup ..	9	2	..	..	Yellowdine ..	77	2	..	..
Cranbrook ..	10	1	..	..	Southern Cross..	39	3	45	3
Blackwattle ..	3	1	123	5	Mount Jackson ..	82	4	24	2
Mt. Barker ..	16	4	192	7	Burracoppin ..	45	2	..	..
Kendenup ..	13	2	177	8	Kellerberrin ..	47	3	81	4
St. Werburgh's...	29	5	..	..	Magowine ..	96	3	76	5
Forest Hill ..	31	5	180	8	Wantoning ..	62	2	..	..
Denmark ..	43	3	..	..	EUCLA DIVISION:				
Albany ..	32	4	188	9	Coconarup ..	163	3	..	..
Point King ..	16	2	180	8	Hopetoun ..	..	..	102	6
Breaksea ..	11	3	128	9	Fanny's Cove ..	191	4	..	..
Cape Riche ..	Nil	..	145	4	Park Farm ..	197	5	..	..
Pallinup ..	11	2	115	4	Esperance ..	189	5	86	..
Bremer Bay ..	15	2	98	5	Gibson's Soak ..	242	4	97	5
Jarramongup ..	70	2	..	..	30-Mile Condenser	179	5	..	..
EASTERN DIVISION:					Swan Lagoon ..	179	8	..	..
Lake Way ..	486	10	87	5	Lynburn ..	160	5	..	..
Mt. Sir Samuel..	462	9	7	1	Grass Patch ..	216	8	..	..
Lawlers ..	475	11	27	4	Israelite Bay ..	325	4	24	3
Diorite King ..	279	5	87	..	Frazer Range ..	157	2	Nil	..
Sturt Meadows ..	271	7	Nil	..	Balladonia ..	207	3	Nil	..
Mt. Leonora ..	259	3	11	1	Eyre ..	179	..	36	..
Mt. Malcolm ..	313	2	1	1	Eucla ..	120	7	41	3

The Observatory, Perth, April 10, 1901.

W. E. COOKE, Govt. Astronomer.

RETURN OF FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING MARCH, 1901.

NAME OF PORT	No. of Ships.	No. of Consign- ments Inspected.	Total No. of Cases.	No. of Cases Passed.	No. of Cases Prohibited.	No. of Cases Destroyed.	No. of Cases in Quarantine.	No. of Cases Dipped.	No. of Cases of												
									Apricots.	Bananas.	Cherries.	Gooseberries.	Grapes.	Lemons.	Nectarines.	Oranges.	Passion Fruit.	Peaches.	Plums.	Rhubarb.	Strawberries.
FRENCHMANTLE ..	8	13	1873	1872	..	..	..	1872	..	2	..	..	..	678	..	523	5	..	642	..	..
ALBANY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
GERALDTON ..	2	2	8	8	..	..	..	..	..	6	..	..	..	..	..	2	..	..	..	..	..
HAMELIN ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSELTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BONBOUY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL ..	10	15	1880	1880	..	..	..	1873	..	8	..	..	..	678	..	523	25	..	642	..	2

DEPARTMENT OF AGRICULTURE,

10th April, 1901.

RETURN OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING MARCH, 1901.

NAME OF PORT.	No. of Ships.	No. of Consign- ments of Trees or Plants.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments Passed.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments of Trees or Plants Prohibited.	Total No. of Trees or Plants in such Consignments.	No. of Packages Dipped.	No. of Trees.															
									Ornamental & Pot Plants.	Almonds.	Apples.	Apricots.	Cherries.	Figs.	Lemons.	Limes.	Mulberries.	Oranges.	Peaches.	Pears.	Plums.	Small Fruits.	Vine Cuttings.	All Other Trees
TOTAL ..	3	3	200	3	200	..	..	4	200	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE
BUNBURY
BUSSELTON
HAMELIN
GERALDTON
ALBANY
FREMANTLE	3	200	3	200	..	..	4	200	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

DEPARTMENT OF AGRICULTURE,
10th April, 1901.

NOTES.

NECESSITY OF TILING.—It is coming to be recognised that aeration is the most important result of tile-draining, that aeration is the best safe-guard against the ill-effects of prolonged droughts in localities where draining on account of excess of moisture would never be thought of. Many soils not at all wet are greatly benefited by tiling. Extensive tracts of notably dry soils have been rendered doubly productive by systematic tiling.

A NEW REMEDY FOR POTATO SCAB.—It has recently been concluded that an alkaline condition of the soil promotes scab in potatoes, while acidity tends to prevent it. In the last three years at the Rhode Island Experiment Station it has been shown that scab is checked by applying any material that develops acidity, while it is induced by anything which, like lime, sweetens it. One grower states that he has successfully treated scab-infected soil by ploughing in a crop of green rye before planting potatoes.

VALUE OF THE APPLE.—The acids of the apple are of signal use for men of sedentary habits, serving to eliminate from the body noxious matters which, if retained, would make the brain heavy and dull, or bring about jaundice or skin eruptions and other allied troubles. Some such an experience must have led to our custom of taking apple sauce with roast pork, rich goose, and like dishes. It is also a fact that such fruits as the apple, the pear and the plum, when taken ripe and without sugar, diminish acidity in the stomach rather than provoke it.

HORSE COLLARS.—Broadly speaking, every implement designed for the use of man is provided with a handle, and this handle is made to fit the hand. It is about a certain size, is rounded, smooth and hard, at least it is never made soft with a view to being easier on the hand. The three qualifications just named should be present in the horse collar. If the collar is the proper length and fits the animal, and is stuffed full and round, it may be as hard as iron without danger of galling the shoulder. Of course the hames must be drawn up high enough so that the draught will not centre on the shoulder point. The logic of this is simple. If the handle of a manual implement galls the hand, it is because of roughness or improper shape—never because it is hard. If it is to be continually used, the man does not pull on a mitten in warm weather to overcome a defect in it; neither does he demand that the handle be made of something soft, but simply that it be shaped and hard. The collar, which is round and hard, rolls on the skin at every motion of the animal, somewhat after the manner of a ball-bearing, admitting the air and thus cooling the parts, but the flat, soft collar sticks so closely that it compels the skin to move on the underlying flesh in such a way as to produce irritation and deep-seated galls.

HEMP AS A MONEY CROP.—This from the *American Agriculturist* may interest some of our readers:—The Department of Agriculture at Washington has conducted the past season, under the supervision of the division of botany, experiments in hemp cultivation on its trial grounds at Washington and in several localities in the Carolinas. No official statements have been published relative to these experiments, but it is understood there is the possibility of widely extending this industry. In Ky a considerable area of hemp has been grown annually for many years. This hemp differs quite distinctly from the product of the Philippines, which comes from a tree resembling the banana in its characteristics; Ky hemp is in the nature of a plant, and the experiments conducted by the Department of Agriculture show in some instances a growth of 10 to 12 feet. The imports for the fiscal year 1900 of all coarse fibres for manufacturing bagging, rope, twine, etc., amount to \$24,000,000 (£4,800,000).

WHY TURKEYS HAVE CROOKED BREAST BONES.—It is generally supposed that the cause of crooked breast bones in turkeys is allowing young birds to roost on trees or other like perches when very young. My observations lead me to believe that such is not always the cause. I am fully convinced that crooked breast bones become hereditary in many flocks of turkeys. I find that breeding for generations from closely related or immature specimens has a tendency greatly to encourage the deformity, as it is always found in flocks that lack vitality or strong constitutional vigour. When the deformity once gets fixed in a flock it is next to impossible to breed it out. Some six years since, a friend who disputed my ideas concerning the cause of crooked breast bones concluded to convince me that I was wrong, and purchased several females from a flock where the deformity was apparent. These females all possessed perfect breast bones and were models in form. A tom was procured from another flock and mated to the hens. His breast bone was deformed, and at least one-fourth of the progeny of that season were deformed like their sire. My friend then selected from this mating several pullets that had nice form and straight breast-bones and mated them with their sire. The young turkeys from this mating were forced to sleep in a building, on straw, until five months of age, and on examining these youngsters I found fully one-half of them with crooked breasts, and mate or care for them as he will he does not get rid of the defect, and until he kills the whole flock and starts with birds from a flock that is not so affected he will have crooked breasts in his turkeys. My advice is, use for breeding only well-developed, nicely-formed birds from flocks that are not affected with crooked breasts, and keep up their vitality by introducing new blood annually, for as sure as your flock degenerates from close breeding, you will get sickly and crooked-breasted turkeys.—MR. GEORGE WOLF in *Farm Poultry*.

HOME-MADE GUANO.—Save all your fowl manure from sun and rain. To prepare it for use spread a layer of dry swamp muck (the blacker it is the better) on your barn floor, and dump on to it the whole of your fowl manure; beat it into a fine powder with the back of your spade; this done, add hard wood ashes and plaster (gypsum), so that the compound shall be composed of the following portions:—

Dried muck	...	...	...	3 bushels
Fowl manure	...	...	...	2 „
Ashes	...	...	...	1 bushel
Plaster	...	...	...	1½ „

Mix thoroughly and spare no labour, for in this matter the elbow-grease expended will be well paid for. A little before planting moisten the heap with water, or better still, with urine, cover well over with old mats, and let it lie till wanted for use. Apply it to beans, corn, or potatoes at the rate of a handful to a hill, and mix with the soil before dropping the seed. This will be found an excellent substitute for guano, and may be depended on for bringing great crops of turnips, corn, potatoes, etc.—*Exchange*.

FLAX GROWING FOR LINSEED.—There is always a pretty fair demand for linseed, especially in dairy districts, where it is used in large quantities for adding the necessary nutriment to skim milk for calves. Moreover, whatever may be the difficulties in the way of the culture of flax for fibre, there is nothing to prevent culture of the crop for the production of paint oil, with a good market for the residue in the shape of linseed cake for fodder. So far as the cultivation of flax in this part of the world is concerned, there is no doubt that in the tableland districts it can be grown as readily and as abundantly as wheat or oats. The soil that suits it best, according to Mr. Fred. Turner—*N.S.W. Agricultural Gazette*, vol. ii., p. 85—is a deep, free loam, with clay subsoil. Thorough cultivation of the soil to prepare it for flax is indispensable for good crops. The land should be ploughed, harrowed, cross-ploughed, and harrowed again, to secure a fine, deep seed-bed. From 35lb. to 40lb. seed per acre should be sown and lightly harrowed in during the month of June in the coastal districts, and up till August in the colder portions of the State. The crop will be ready for harvest in from four to four and a half months, when it can be reaped or headed like a wheat crop. A large grower of flax for seed alone, in California (Mr. R. Mauvais), recommends in *Pacific Rural Press*, leaving the flax in the stack for three or four weeks to sweat. Then he threshes it with an ordinary wheat-threshing machine. In California the flax crops yield on the average 2,000 to 5,000lb. seed, according to care in cultivation and season, which sells at a penny a pound cash. In the least favourable districts for flax culture, yields run from 1,800 to 2,000 lb. seed per acre, which is considered to be more remunerative than cereal culture.

POULTRY.

BY A. CRAWFORD.

Well-bred fowl are now common all over the State, and many persons who have paid a good price for birds are not able to tell whether they are good ones or not, and when they refer to a book of poultry for information on the subject, they are puzzled by the technical terms used, and after consulting it are just about as wise as they were before. From thus not being able to get the information that they desire, they often refrain from showing, or, on the other hand, may show birds that are utterly devoid of merit through want of knowledge of the breed. In order to remove that difficulty as far as possible, in the present issue will be found a figure of a cock with various numbers all over him. By referring to the letterpress, the names of the various parts of the plumage and bird can be seen. From this the description that would otherwise be unintelligible can be easily understood. When one wants to know whether a bird is a good one or not, it will only be necessary then to get the description given of that particular breed and compare it point by point with the bird to be judged, a very good idea can then be formed as to whether the bird is good or not. A bird may, however, be almost correct as to the points and yet not be fit to win a prize. There is an undefinable something that must be present—one can scarcely say what—but it is made up of carriage, condition, character, which if absent, no matter how good the bird may otherwise be, he will be lacking the quality required to make him a prize-winner.

In addition to the points shown in the illustration, there are a number of other terms used, and some of those most commonly in use are the following:—

Beard:—A bunch of feathers under the throat of some breeds such as Handans.

Carriage:—The bearing, attitude, or style of a bird.

Carunculated:—Covered with fleshy protuberances, as on the neck of a turkey cock.

Condition:—The state of a fowl as regards health and beauty of plumage—the latter especially.

Crest:—The crown or bunch of feathers on the head, same as top-knot.

Cushion:—The mass of feathers over the tail end of a hen's back.

Deaf Ears:—The folds of skin hanging from the true ears, same as ear lobes.

Dubbing:—Cutting off the comb, wattles, etc., so as to leave the face smooth and clean.



Fig. 68

NAMES OF VARIOUS PARTS OF A FOWL.

(See Illustration.)

- | | |
|-------------------|------------------------------------|
| 1. Comb | 12. Wire Tail Feathers |
| 2. Face | 13. Wing Bow |
| 3. Wattles | 14. Wing Coverts forming the "bar" |
| 4. Ear-lobe | 15. Secondaries |
| 5. Hackle | 16. Primaries or Flights. |
| 6. Breast | 17. Point of Breast-bone |
| 7. Back | 18. Thighs |
| 8. Saddle | 19. Hocks |
| 9. Saddle Hackles | 20. Legs or Shanks |
| 10. Sickles | 21. Spur |
| 11. Tail Coverts | 22. Toes or Claws. |

Flights :—The primary feathers of the wing used in flying, but tucked out of sight when at rest.

Fluff :—Soft downy feathers about the thighs.

Furnished :—Assumed the full characters—when a cockerel has attained his full tail, comb, hackles, etc., as if adult, he is said to be furnished.

Hock :—The knee or elbow joint of the leg.

Keel :—A word sometimes used for the breast bone.

Leg :—In a live fowl this only applies to the scaly part.

Pea Comb :—A triple comb resembling three small combs in one, the centre one being the highest.

Pencillency :—Small markings or stripes over a feather.

Poult :—A young turkey.

Self Color :—The same color all over.

Shaft :—The stem or quill part of a feather.

Spangling :—The marking produced by each feather having a large splash or spot of some other color different to the ground color.

Squirrel-tailed :—The tail projecting in front of a perpendicular line over the back.

Stay :—Another name for a young cock.

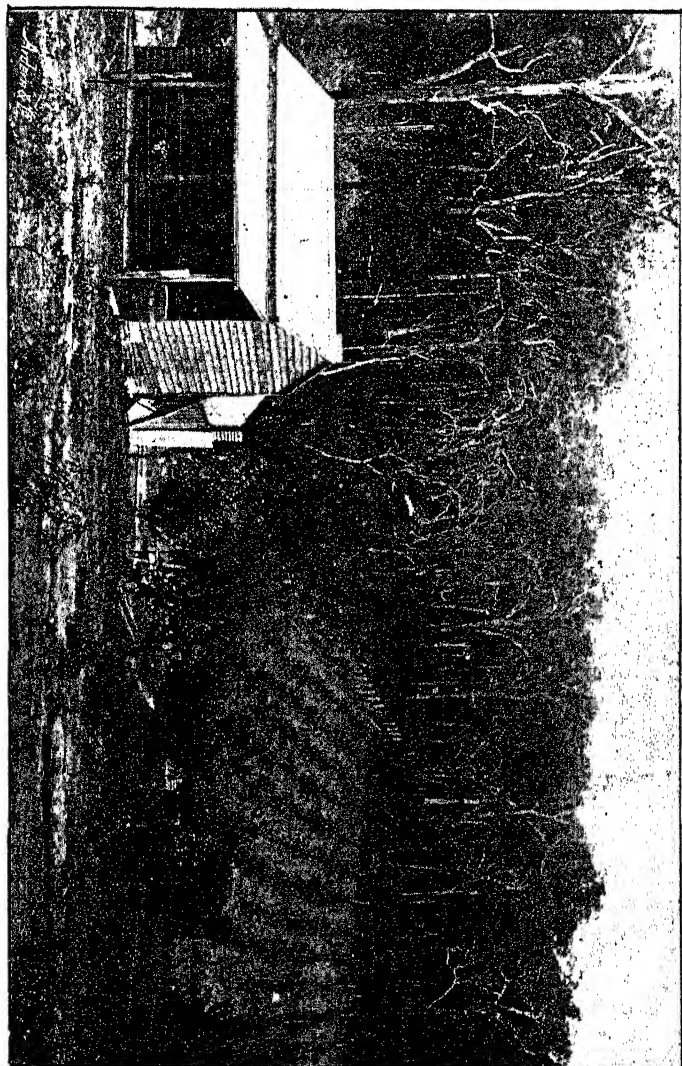
Under Color :—The color of the plumage seen when the surface feathers have been lifted up.

The knowledge of the foregoing terms is useful when reading any thorough description of any breed of poultry.

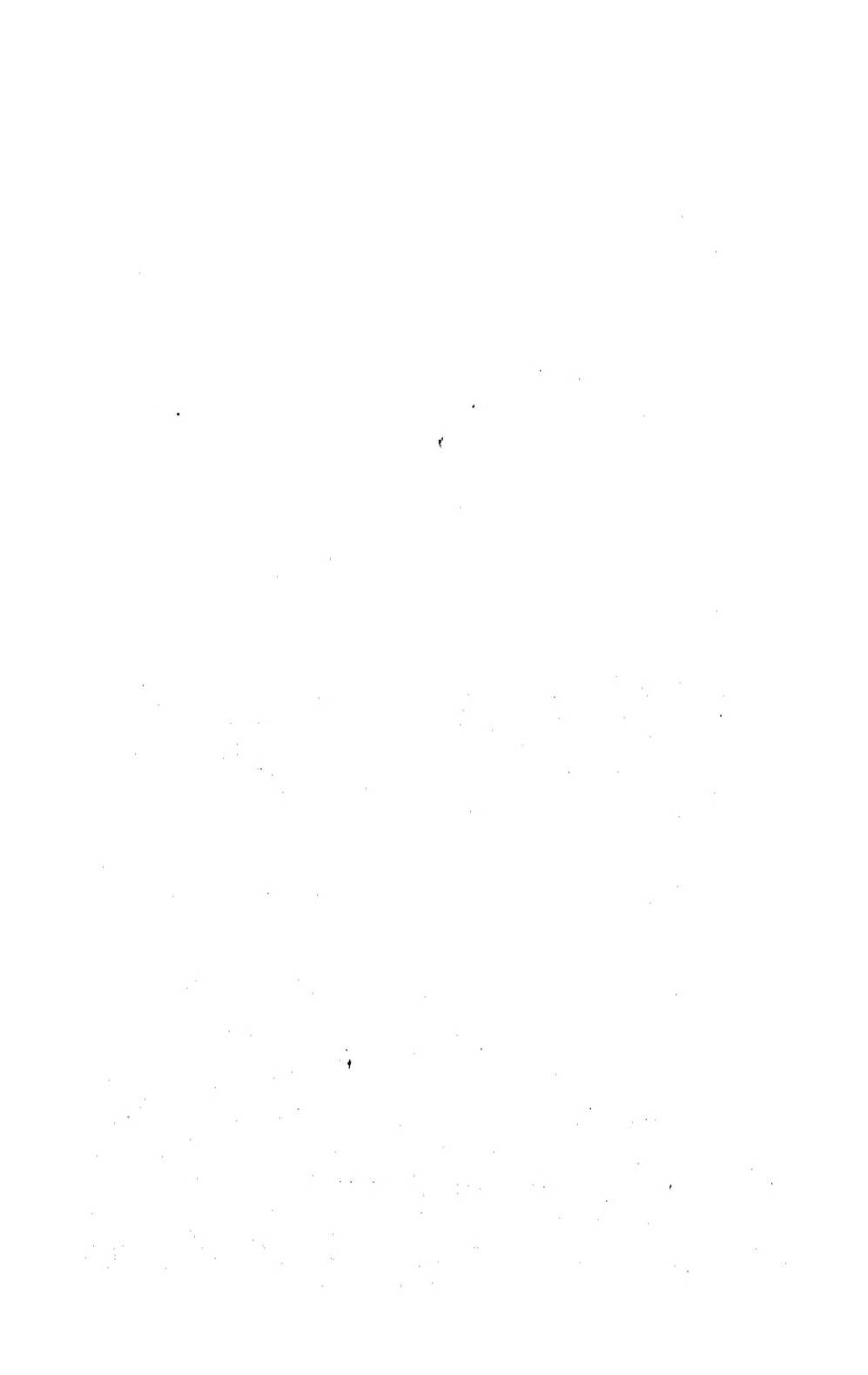
A ONE ACRE ORCHARD.

Mr. George Birkenshaw, of Smith's Mill, some three years ago started to clear and plant an acre of ground, which to-day is a picture of health, and shows what anyone can do in their spare time. We give an illustration of the place. The trees planted are 35 apples, 13 pears, 7 oranges, 7 lemons, 8 peaches, 4 Japanese plums, 8 apricots, 4 quinces, 2 loquats, 2 guavas, 2 figs, and half an acre of vines.

CARE OF COLTS.—In the care of colts there is no feature that requires more undivided attention than the legs, including the feet. If the colt keeps right on his legs they continue properly set and free from puffiness, and he is apt to come out all right as a horse, but once wrong there as a colt it is impossible to prevent it becoming aggravated as he approaches maturity. For this reason the feet require much attention both in the yearling and the two-year-old, just at this time.



ONE ACRE ORCHARD, SMITH'S MILL.
(See opposite page.)



THE INSECTIVOROUS BIRDS OF WESTERN AUSTRALIA.

BY ROBERT HALL.

ROBINS.

Without doubt, Robins are recognised as harmless in the interests of the Agriculturists, while they are decidedly useful. Many little birds are daily seen before us, but we seldom associate the name of Robin with any of them. The fact is all birds with red breasts are no more Robins than all Robins have red breasts. Breasts of this color are very limited in the small species of Australia, and with them we have either a Mistletoe-bird, a Chat, or true Robin. Few of us have seen the dwarf-like deep blue and red bird that spends much of its time in search of the fruit of the Mistletoe. This is because of its diminutive size, quiet manner, and soft notes. While this latter species is distant in this manner, and the Chats sociable with their own kind, the Robin is a homely bird and will make the settler's home and garden its hunting ground.

The popular idea that every Robin has a red breast might be laid aside at once, as one of the most useful of the family is black and white. Silent and unobtrusive it plays its part in nature with a decided and favorable result. A third example has a very yellow breast, while a fourth has a white one. These are contrasted in colour, yet very much alike in form. The structural characters differ sufficiently to cause them to be placed under different heads, *i.e.*, genera. Of the species on the eastern side of the continent, one is pink, and another rose breasted.

Further, Australia has some very beautiful little birds that are catalogued as Robins and specifically in such terms as "White-browed" "Large-headed" and "Buff-sided." The first is known to inhabit the coastal part of Queensland on the same degree of latitude as the last does at the source of the Fitzroy River of the North West. Possibly the strangest species is our Scrub Robin (*Drymadus*). It is only distantly related to the true Robins, but enough to satisfy us that it is so. While our "Red-breasts" frequent the open and the "Yellow and White-breasts" the outskirts of the shrub lands, this species with its long legs keeps to the ground vegetation of the scrub. In the nesting habit each shows a different result. The "Red-breasts" build well up in small timber, the "Yellow-and-White" within a few feet of the ground, in shrubs, while the Brown-bird (*Drymadus*) constructs a nest upon the ground in the scrub. Australian Robins differ from those of any other part of the world, and I believe more so among themselves.

WESTERN SCARLET-BREASTED ROBIN.

Petroeca Campbelli, Sharpe. (*Pet-re-ka Cam-bell'i*).

Petros, a rock; *oikos*, a family; *Campbelli*, a proper name.

Petroeca Campbelli. Preserved specimens Victoria Museum, Perth. "Key to the Birds of Australia." Hall. p. 13 (1899).

GEOGRAPHICAL DISTRIBUTION.—Area 9.

KEY TO THE SPECIES.—Male: Breast scarlet; throat black; small white mark on forehead; upper surface black. Female: Throat and back grey; breast faintly marked with red, bill about equal in height and breadth at the nostrils. Young: Similar to the female, without any trace of red.

The western and eastern sides of the continent appear to be represented by a closely allied species, but as the white mark of the forehead is small in our form and large in the eastern bird, this constitutes a difference, even if only that of a sub-species, and the eastern bird retains the name of *P. leggi*.

This latter is found as far north as Queensland, while our bird is more southern, and restricted to the area of most regular rainfall. Thus it frequents the heavily timbered land of the South-west and the Stirling Range at Tor Bay. I have collected it in many stages during September, and these phases will make the first record of the plumage development of the species. It was not till a recent visitor to the State, Mr. A. J. Campbell, had observed something unusual in the adult male that an enquiry was made. This was less than 18 months ago. There seems to be a law of coincidences with Robins, as with other things, because immediately following the discovery of an undescribed Robin in the South-West of this State, the present writer recognised an hitherto undescribed Robin in the South-East of the Continent. This proved to be the fully adult stage of the common Flame-breasted species. (*R. phanicea*, Gould). It merely shows how two very common birds, that yearly pass before the eyes of thousands of people, specialists included, may go unnoticed. Here comes to mind the story of "eyes and no eyes," which tempts us to use them better in the future than in the past. Seeing a pair of this species in the bush of the Spring time is like seeing one's ideal of a bird; all is affection and grace, in keeping with the surroundings. Towards the end of winter the scene of domestic life has quite passed away, and the male Robins prepare for a repetition, or enter the lists for the first time in the choosing of a mate for the seasons. Thirty or even forty red-breasted birds in a field is a gay scene, but now the warriors prepare for a mild form of battle, and many a future wife looks on with timid frame at the quarrelsome bird in the full array of color. It may be a serious affray, but it does not look so. The most of them use their bills to sound like the clipping of shears, and pretend to seriously war. Still they quarrel among themselves, showing one clearly that they are to be tabled among the jealous and fighting creatures. It is said the smallest bird is relatively the most pugnacious, *i.e.*, the Humming

Bird. Robins, when choosing wives before Spring, may be placed in the same category. That is the time of the year to study them, for, with the incoming of this season, the males strongly vie with one another, and depend most upon their gay dress to attract their future little wives, who are clad in simple and sombre plumage. Having passed many weeks in the more open country during the cold months, they subsequently pair and retire to the forest till the warmer ones have come and gone. As previously remarked they are then very happy, and loyally catching noxious grubs they eat them, but do not pursue, like the fly-catchers. They hunt about for every meal, and never keep a storehouse. Some birds have to work very hard indeed for a living, but the Robin manages, by selection of good ground, to do well. I have never once seen a Robin eat half an insect and throw away the other half. It seems a rule never to do so, and a very good one it is. While certain birds teach us thrift, this one plainly seems to indicate the maxim, "Waste not, want not."

Nest.—Cup-shaped, firmly and neatly built of bark, ornamented on the outside with mosses and lichens, and lined inside with dry grass, feathers, etc. It is placed within 15 or 20 feet of the ground, generally on a horizontal branch, but occasionally within a perpendicular fork of a tree.

Eggs.—Three or four for a sitting. Ground colour, creamy white or very pale green, both with spots, greyish, blue and brown. Length, 0.75 inch; breadth, 0.6 inch.

RED-CAPPED ROBIN.

Petroeca goodenovii. Vig. and Hors. (*Pet-re-ha gud-e-n'ove-é*).

Petros, a rock; *oikos*, a family; *Goodenough* (proper name.)

Petroeca Goodenovii, Gould, "Birds of Australia," fol. vol. iii. pl. 5. "Key to the Birds of Australia." Hall, p. 13 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas, 9, 8, 7, 6.

KEY TO THE SPECIES.—Male: forehead red, throat black. Female: body greyish; forehead faintly marked with red; no red in young; bill about equal in height and breadth at the nostrils. White bar on wing. Total length, 4.25 inches.

The smallest of our Robins is well distributed in tolerably dry country. Two species have red caps. This one, without a red throat and named before the other was discovered, is better known. One may observe the northern red-cap on the Fitzroy River, and the Southern one near King George's Sound. Although other Robins inhabit the central and eastern districts, this species is the most commonly seen. There is the black and white Robin, as well as a grey scrub Robin. This last species (*Drymadus brunneopygius*, var *pallidus*) belongs to another genus, and in more respects it differs from *Petroeca* than the latter does from *Saxicola*, the British Robin. This beautiful and sprightly little creature, that is just vain enough in winter to fully show its coat of brilliant color, retires to the bush in early spring. There it arranges to

build a compact and elegant cup-like nest. The time occupied in the building of this house will vary with the circumstances, but 12 to 15 days is about the duration of the bulk of the cases. When finished it is an elegant home, strong in beauty by the external decoration with mosses and lichens.

The eggs, two in number, or three on rare occasions, are laid on successive days, and the time occupied in incubation is 14 days.

The birds have two broods in a season, the first in August and the last in November. Very young birds are flying about in September, and extra-tropical birds are accompanying their parents in April. The young males of last year nest in the following August, but they are unmatured as regards their plumage, and resemble more the hen birds. This early breeding applies also to the Hooded Robin. It is specially sensitive to danger, and when any person approaches the nest or young the male feigns a broken wing, and with active legs hopes by this means to draw you away from the seat of anxiety. One of my friends, who has had considerable experience with the birds of his district, considers this species the most useful insectivorous bird in that part of the country.

The first time the red-breast was seen in Australia by a naturalist, I am inclined to believe, was upon a boulder in a field, and during winter, hence the name. Robins glory in a stony field, and flit from one rock to another, resting a considerable time on each with great glee. The hen birds are not musical, but seem to very much enjoy listening to the song of two or three males. Very natural!

Nest.—A delicate cup-like structure of the same material as the previous species, but more neatly built, and very prettily ornamented with mosses to appear like the bough or fork on or in which it may be placed.

Eggs.—Generally four to a sitting, sometimes three. Ground color, greenish-grey, with lilac-brown spots, especially around the greatest diameter of the breadth. Length, 0.6 inch; breadth, 0.5 inch.

HOODED ROBIN (Black and White Robin).

Petroica bicolor, Vig. and Hors. (*Pet-re ka bi' kul-or*).

Petros, a rock; *oikos*, a home; *bi*, two; *color*, color.

Petroica bicolor, Gould, "Birds of Australia," fol. vol. iii., pl. 7. "Key to the Birds of Australia." Hall, p. 14 (1899).

CEOGRAPHICAL DISTRIBUTION.—Areas, 9, 6, 4, 3.

KEY TO THE SPECIES.—Under surface, white; insertion of wing, white; base of tail, white. Male has a black throat, the female an ashy one. Bill about equal in height and breadth at the nostrils. Young—Dark brown above, lighter below; wings and tail like female. This is an elegant and unassuming Robin.

Very few people know the relationship of this species, and to consider it as equal with a "red-breast" seems just beyond reason. But it is not so, because, if you compare the two, the difference is



HOODED ROBIN (Black and White Robin).

simply a matter of color. The structure is very much the same in each case. The construction of head and bill, dispositions of tail and wing feather, and style of legs and feet all help to harmonise. The old name of "Black and White Nymph of the Woods" (*i.e.*, *Melanodroas bicolor*) exactly suited the bird as far as appearances go. It is a denizen of the light timber, and never ventures as a rule to leave the covert suited to its nature. We cannot always trust to outward appearances in the definition of bird species, any more than we can in other matters.

The Hooded Robin is an active insect hunter, darting from bush to bush in search of insects or their larvæ.

Nest.—Cup-shaped, composed of bark and lined with fine grasses. It has the general appearance of any Robin's nest, but is not so finely built as the most of them, and is placed nearer the ground.

Eggs.—Three to a sitting, sometimes two. The ground color is apple green, without spots, or paler green, without spots. Length, 0.75; breadth, 0.6 inch.

GREY-BREASTED SHRIKE-ROBIN (Yellow-Robin).

Eopsaltria Georgiana, Quoy and Gaim. (*E-op-sal'tri-a jor-ji-a'na*.)*Eos*, dawn; *psaltria*, a female harper; *George* (*Georgius*), a personal name.*Eopsaltria griseogularis*. Gould, "Birds of Australia," fol. vol. iii, pl. 12.

"Key to the Birds of Australia," Hall, p. 33 (1899).

GEOGRAPHICAL DISTRIBUTION.—9, 6.

KEY TO THE SPECIES—Abdomen bright yellow; forehead and upper chest grey; bill at nostrils broader than h.g.h, culmen 0.7 inch.

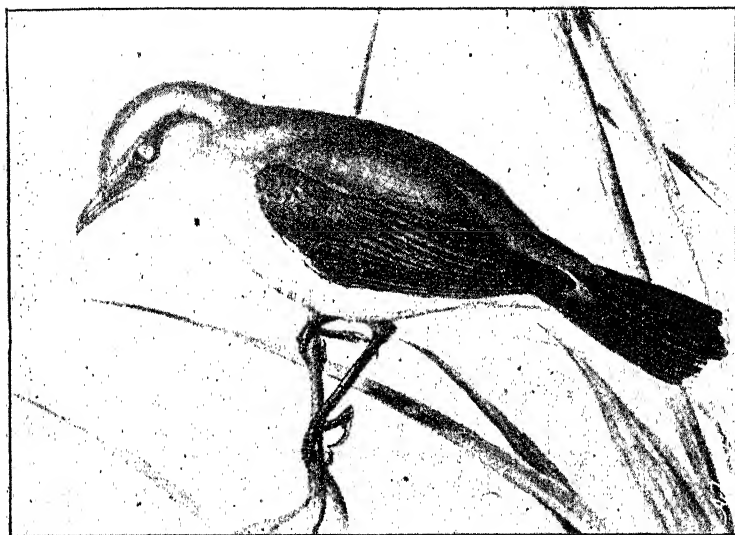
The home of this strangely colored Robin is in the moist and densely timbered South-western portion of our State.

The growers of the small kinds of fruit will some day realise the value of this most thorough insect-eater, for where there is a humid valley this is one of the sure birds to be daily found doing its duty. I have had similar experiences with the Yellow Robin of New South Wales as with the one here. The silent unobtrusive bird, that would not so much as disturb a thought of the naturalist in the glen, will remain for minutes together without any apparent movement of muscles or feathers, attached in a perpendicular position to a tree. Both watcher and watched are as if unmovable and uncomfortable, and the thought naturally arises in five minutes' time who is to be first in the move; however, the bird settles it by noiselessly darting at a fly, and regaining a position that warrants a change for you also. The bird will fly from undergrowth to stem of tree, clinging thereto as in the manner of the tree-creepers, but not creeping. One Saturday afternoon I approached a tree, thinking to take off what I considered at the distance to be quite a new fungus when, without any previous movement, the object became winged, and away went a Yellow Robin. This species is one of the foster parents of the Pallid Cuckoo, *Cuculus Pallidus*, a bird somewhat similar to *C. flabelliformis*. On 24th November I saw birds in many grades of plumage, juvenile to adult markings, in this year's brood. The changes are rapid—first, yellow on the neck; second, chest yellow; third, nearly developed yellow, with straggling brown feathers showing irregularly along dorsal surface. By November the nests become deserted. In one the fearless bird had to be pushed off before it would evacuate. Although the nests are generally placed within a few feet of the ground, I noticed one at twenty feet from it. New nests are sometimes placed two feet above those of last year in the same shrub, or a three-pronged perpendicular sapling or, which is usual, a horizontal light branch.

Nest.—Cup-shaped; placed in scrub and near the ground, in a fork or on a limb made of bark, covered with mosses and shreds of bark, and lined with grasses.

Eggs.—Two or three to a sitting. Ground color variable between deep green and deep olive green with markings of tawny or brownish red, zoned more or less clearly around the broader end. Length 0.8 inch; breadth 0.6 inch.

WHITE-BREASTED SHRIKE-ROBIN (White-bellied Robin).



Eopsaltria gularis, Quoy and Gaim. (*E-op-sal'tri-a lu'ris*).

Eos, dawn; *psaltria*, a female harper; *gula*, throat, (*gularis*, pertaining to the throat).

Eopsaltria leucogaster, Gould "Birds of Australia," vol. iii. pl. 13. "Key to the Birds of Australia," Hall, p. 33 (1899).

GEOGRAPHICAL DISTRIBUTION.—9, 5.

KEY TO THE SPECIES.—Under parts white, rest of plumage dark slate; tips of tail feathers white, a small triangular black spot immediately before the eye; a faint line of greyish white above the eye; bill at nostrils broader than high; nostrils in a coriaceous groove, with an imperfect operculum.

The relation of the habit and habitat of this species and the previous bird is a close one. Both inhabit the moist country and may be observed in the Darling Range at considerably over a 600ft. elevation—wherever there is a gurgling stream, plenty of undergrowth and a good rainfall we may certainly expect to see either one or other. It will once more be a matter of eyes or no eyes whether the bird is seen or not. It is extremely quiet and secluded in its ways, being even more so than the other species of this genus.

Between Vasse and Augusta, Robins appear to be plentiful. The writer's winter's experience of the above species was mostly obtained from the wild country where the thriving milling township of Denmark is situated.

So remarkable a fact is it that the *Eopsaltria* prefer a gully almost absolutely quiet, so much so that one inclined to the study of such birds can nearly always tell by its nature of vegetation whether or not it will contain Robins. The same applies in the similar physical features of South-east Australia.

The floral surroundings are slightly different from each other, just as the species of Robins are different. Yet the predominant feature of eucalyptus growth, so remarkably represented at the southern corners of the Continent, holds together the genus *Eopsaltria*, one type of robin.

Speaking from the point of view of the geologist, the birds that bind Eastern Australia, through Victoria, to us, have been broken by the changed conditions of southern South Australia. While it is my opinion Robins and certain other birds freely passed from the forests of the South-west corner to those of the South-east, or *vice versa* in the first place, the changed features of the country between the two now prohibit intercourse of humid valley birds in occident and orient. Isolation has encouraged differentiation of the species, and for this probable reason the Western members of the genus differ from those of the Eastern.

The nature of the vegetation in which these birds live presents material for even a more remarkable history, but on that one cannot here dwell.

Nest.—Open-rounded and cup-shaped; made of bark, ornamented with pieces of mosses, lichens, and loose pieces of bark, lined with dry grasses.

Eggs.—Three to a sitting; variable as with the preceding species.

A FORTUNE IN MAIZE STALKS.

In an article in the American "*Arena*" Mr. B. O. Flower, one of its editors, writes a review of the bygone century as a pre-eminently utilitarian age; instancing, in proof of it, what has been done during its currency in the way of turning by-products to economise advantage; of utilising the mighty forces of nature for the benefit of men, and of inventing labor-saving machinery and of improved methods of performing necessary work. A remarkable illustration of the conversion of comparatively worthless material into highly valuable products by scientific processes is furnished by what has taken place with respect to the stalks of Indian maize. Where this is grown on a scale of the greatest magnitude, in the mid-western and southern States of the American Union, it was customary either to turn cattle into the fields after harvest, or to allow stock owners to do so for a nominal payment of 2s. 6d. per acre. During the last five years of the century, however, science stepped in, and revolutionary discoveries were made, owing to

which, "the despised corn stalk has become almost as valuable as the corn it produced," and farmers in several parts of the country, instead of obtaining 2s. 6d. per acre, are receiving from 24s. to 48s. per acre for the stalks. In the great corn belt which runs through eight of the States there are about 50,000,000 acres under cultivation for maize; so that, if only £1 per acre is added to the value of their produce, it means an addition of £50,000,000 sterling to the income of the farmers, who at present obtain a return of 24s. to 40s. per acre for the maize they grow. The products of the corn stalks are so various, and each is of such great utility, that there does not appear to be much risk of the demand for them falling short of the supply. These are the articles that have already been made, on a commercial scale, from the stalks:—

1. Cellulose for packing coffer dams of battle ships, thus preventing them from sinking when pierced by balls or shells; because the water on first entering is at once absorbed, causing the pith to swell and close up the perforation, automatically as it were.

2. Pyroxylin varnish, a liquid form of cellulose, the uses of which are practically unlimited.

3. Cellulose for making smokeless powder and other high explosives.

4. Cellulose for packing: it being the most perfect non-conductor known against heat or electricity, jars or blows.

5. Paper pulp; and it is predicted that fine book paper will be one of the products of the stalks, and will arrest the alarming destruction of the American forests for wood pulp, which is now proceeding.

6. Stock food made from the fine ground outer shells, and from the sides or joints of the stalks.

7. Mixed feeds for stock by adding to the above numerous other by-products from sugar refineries, distilleries, cider presses, etc.

8. Poultry food of two types; namely, for laying hens and for fattening purposes.

As there are already 336,489 acres of land under cultivation for maize in the Commonwealth of Australia, together with 17,429 acres in New Zealand, yielding a total crop of 9,238,623 bushels in the year 1899, these discoveries of the commercial value of the by-products of the grain may have an important influence in the time to come upon the cultivation of maize in Australia.

WATER FOR CATTLE.—There is nothing more injurious to a steer on full feed than to go without water for a day or two. They not only shrink while without water, but when they do get water they drink too much, which throws them off their feed and causes them to scour.—M. S. Rosco, Nebraska.

REARING CALVES WITHOUT MILK.

BY A. CRAWFORD.

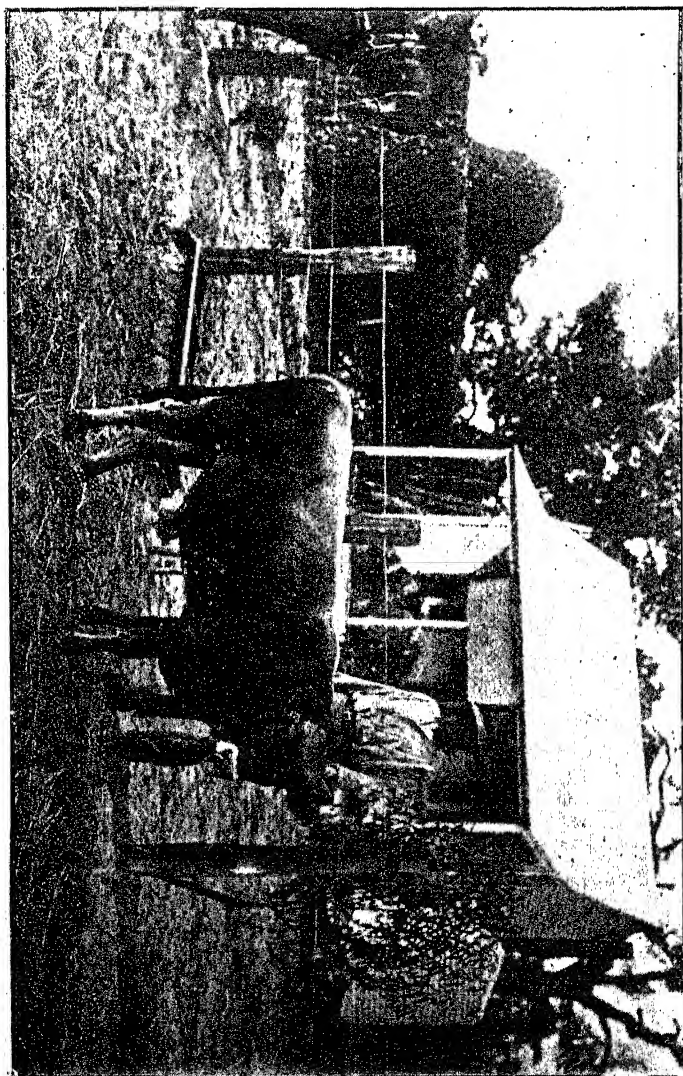
In this month's JOURNAL will be found illustrations of three young Jersey bull calves that have been reared without milk from a very early stage. They are well-grown, good in bone and substance, and not the least pot-bellied.

"Fowler Bee" had much more milk than either of the others. He was almost three months old when purchased. "Lillian's Progress" was only two or three weeks old when the milk was stopped, and "Fowler Boy" four weeks old. The substitute used was linseed and flour prepared as described in a former issue of this JOURNAL. Many farmers in this State object to the use of separators, saying that good calves cannot be reared on separated milk. This is a great mistake. Very fair calves can be reared on separated milk alone, if given fresh and not allowed to sour, and not put into dirty troughs to feed the calves in. Better ones almost, if not quite equal to those fed on whole milk, can be reared if some linseed or oil cake be added to it. These young bulls are being reared by the Department of Agriculture for stud purposes, and as soon as they are old enough they will be available to farmers for their dairy herds. They have been selected, not only from cows of the best breeding available, but cows that are extra good butter cows. The mother of one has made 17lb. 3oz. of butter in one week, and has given an average of over 16lb. of butter a week for over five months.

"Fowler Bee" is a young bull, just about 12 months old, and out of "Honey Bee," a cow bred by Mr. Alick Murray, of South Australia, and is a most persistent milker, it being impossible to dry her off, milking up to calving time each season. The sire is the Government bull "Fowler Lad," one of the best Jersey bulls ever imported.

"Lillian's Progress" is eight months old, and is out of "Lillian," a cow bred by Mr. Alick Murray, of South Australia, and won first prize when a heifer at the Royal Show, Adelaide. She is also a persistent milker, keeping right on to calving time, and comes from a heavy milking strain. Her sire was the celebrated "Progress III.," the best bull ever imported from Jersey, and never beaten in the show ring. She is also descended from "Commassie" and "Garonne." The former was the champion cow in the Island of Jersey in '78, '79 and '80. The latter was sold for 750 guineas, and gave 20 quarts daily when in full milk. The sire of the calf is "Fowler Lad."

"Fowler Boy" is out of "Maud I.," and is nine and a half months old. Her dam was the famous imported cow "Maud," that won several championships in England. The sire was "Neat-boy," the champion bull in Victoria. "Maud I." is the mother of several winners. She is a fine butter cow, making over 14lb. per



"FOWLER BEE," Reared Without Milk.
(See Page 308.)

week, and keeping that average up for over six months. The sire of the young bull is also "Fowler Lad."

"Fowler Lad," who also is illustrated, is by "Fowler King," ex "Lassie Fowler," both well-known champions. On both sides he is descended from the bluest of blue blood from the Island of Jersey. Thirty-two cows and heifers of the family he comes from averaged 16lb. 11oz. of butter per week.

RECENT STOCK IMPORTATIONS.

BY A. CRAWFORD.

HACKNEY STALLION.

By the s.s. Tangier, going North, Mr. Durack is taking with him a very fine young hackney stallion that he has just imported from New South Wales. He is a little over two years old, and is a well-grown colt, brown in colour, with a small star and one white foot. He has splendid bone and substance, sound as a bell all over, and a fine shoulder. He might, perhaps, be a little higher in the wither, but this may develop as he grows older. Such a horse is sure to make his mark for good on any station where he is used. The deficiency of most of our blood horses is want of bone, but such sires as this, crossed with well-bred mares, should give the right class of horse suitable for remounts.

He was bred by Philip Charley, of New South Wales, and is by "Lord Derby, junior," out of "Wretton Lady." "Lord Derby, junior," was imported from England, where he won six firsts and one special prize. "Wretton Lady" is also imported from England, where she won first prize the only time shown.

POLLED NORFOLK BULL.

By the same ship Mr. Durack is also taking up a young polled Norfolk bull. He is red in colour, and is a real little block. For his age he is remarkably well-developed, being long and well let down in his body, and beef to the heels.

Some of this breed turn out very good milkers, and in parts of England as much sought after as dairy cattle. This, I believe, is the first one of the breed imported into this State, and even in the Eastern States, where they are rather uncommon. The sire is "Primate," and the dam "Cherry Bloom," both from imported stock, and from great prize winners, the grand sire of the young bull having won ten first and champion prizes in England, and grand dame five. The parents are also noted winners in New South Wales.

It seems a pity that the importers of such valuable stock should only import sires, instead of bringing over dams to breed from here, so that instead of having to go to the East when good stock is wanted, they would be available here, and save the heavy cost of importing them, and the risk attendant and the voyage over.

NOTES ON PRUNING.

BY A. DESPEISSIS.

Numerous enquiries reach the Department of Agriculture every season on the matter of pruning. The subject has already been discussed with detail in previous publications, and to Parts 4 and 5, Vol. V., 1898, of the *Producers' Gazette and Settlers' Record* I must refer those in search of more definite information on this subject.

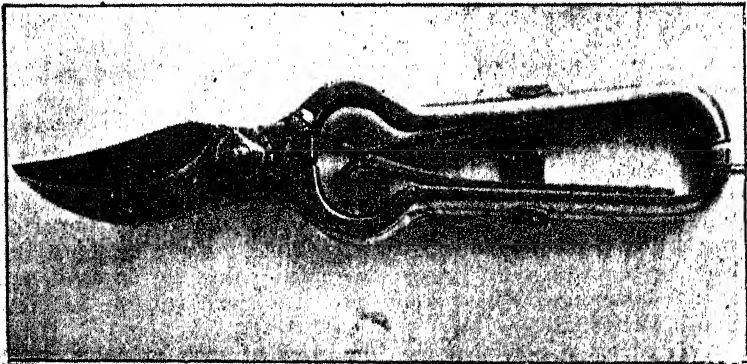
Of the methods of pruning, there are two practised in the orchard, viz.; winter pruning and summer pruning. In the course of these notes, the first method alone will be considered.

Several objects are aimed at when pruning. It helps to control the growth of the plant and train it in such a way that the operations of cultivation, of treating and dressing the trees and vines whenever required, and of gathering the fruit, are made easier and more economical. It equalises the wood and fruit capacity of the tree, checking the one to favor the other if need be, suppressing rank growth of the boughs or limiting the productiveness of the plant in such a way that the quality is not affected by the excessive quantity of the fruit crop.

It checks the growth of suckers, water sprouts, and unsightly knobs and enlargements along the stem and branches; it tends to keep the plant in a thriving and healthy condition, promoting the growth of luxuriant foliage which tend to shelter the fruit and limbs from sunburn.

PRUNING OUTFIT.

The tools required for pruning are few, but it is essential that they should be of the best quality and of a type suitable for the



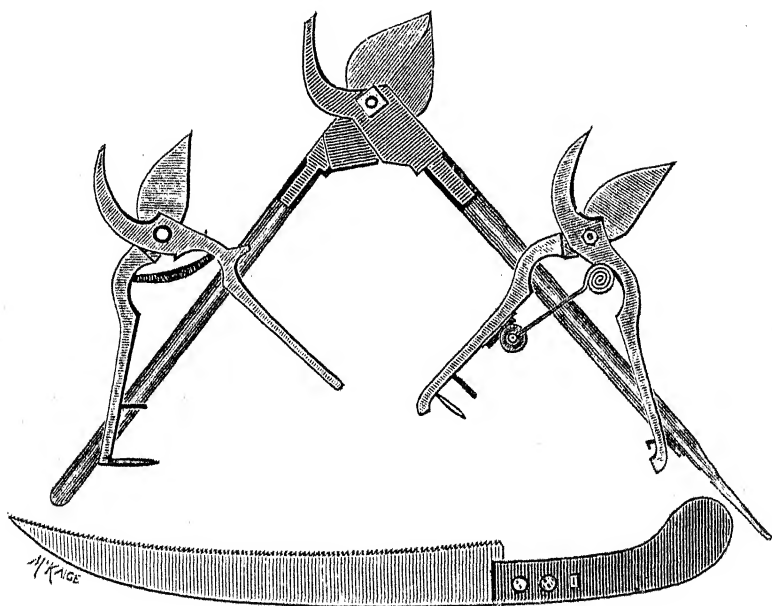
SECATEUR.

work to be done. It is also essential that they should be kept in good order, sharp and smooth, as a jagged or a blunt blade will inflict upon the wood bruises and injuries which will either cause

the sap to sour and the limb to die back or will delay the healing of the wound and thus leave a door open to the entrance of the fungi of canker and other moulds productive of rot and decay.

Secateurs, or pruning shears, are easier to handle than the pruning knife. They do the work quickly, neatly and without giving a jerk to the branches of fruit trees and vines as does the pruning knife.

The first illustration represents Rieslter's Secateur, which can be procured in Perth. It is sold with a duplicate blade made of well-tempered steel, the prong is made of chilled steel, the tool is 9 inches long, strongly made and well finished.

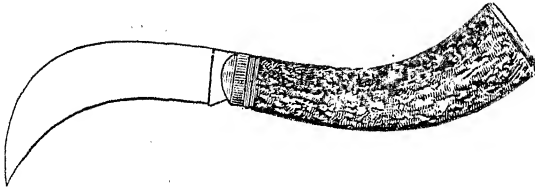


The second illustration shows two types of secateurs and a handy pruning saw. The longer pruning shears, 15 to 17 inches long, is a two-handled one and a very powerful tool, suitable for pruning strong vines and hard and knotty wood. One of its handles is chisel-shaped and is found very convenient for suckering vines or trees, an operation which, when made with the blade, jags its edge and makes it blunt.

The edge of the blade of the secateur should be kept sharp by the use, whenever required, of a small hone or an oil stone, while the file will keep the teeth of the pruning saw well set.

When using the secateurs a clean and neat cut is given by seeing that the blade, and not the prong, faces the part of the wood which is left on the plant. As strong branches as can well be inserted between the blade and the prong can with little effort be

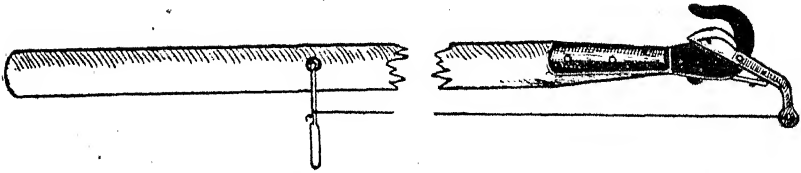
snipped by gently pushing the top part of the branch or rod it is intended to cut away from the operator and against the prong side of the secateur



PRUNING KNIFE.

The pruning knife, if kept sharp, will, in the hands of an experienced pruner, do very good work, and makes a very clean cut, which soon heals over. The blade should be strongly made, of the best steel, and with a beak curved at a sharp angle. A rough buckhorn handle will ensure a good grasp in the hand while in use; the blade, well-ground, will be found useful for trimming and paring the wound, and giving it a smooth face after sawing.

To the other tools and appliances described, the following two will be found of great use when high trees have to be pruned and handled :—

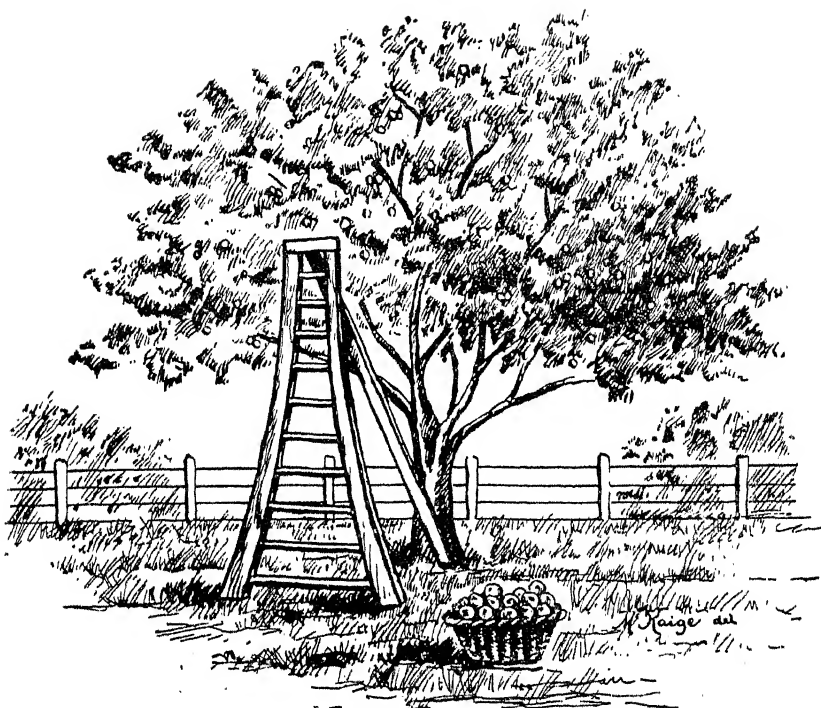


BRANCH CUTTER.

This long pruning shear, mounted on a light pole about the size of a broom stick, six to eight feet long, is a very handy device for reaching to the tops of the higher trees. It is found at the leading ironmongers.

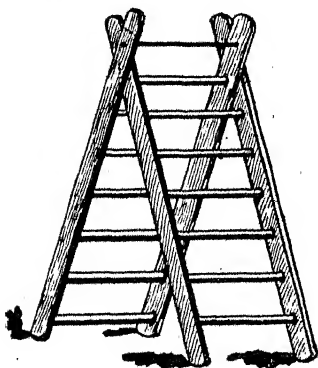
An orchard ladder, properly constructed, is a very handy appliance when pruning trees and gathering fruit.

Orchard ladders of several designs are made. Some consist of a pole of a fibrous kind of timber, such as stringy-bark, bound with a strong band of hoop-iron a foot or so from the top end; this will prevent the pole, which is sawn to that point, splitting when the two lower ends are stretched and the rungs fastened.



TRIPOD FRUIT LADDER.

Hinged, four-footed step-ladders, like the one here illustrated, are, as a rule, clumsy appliances, which are inconvenient on hill-side or uneven ground, besides being heavy and easily dislocated. Those found ready-made for sale in shops are often so lightly made as to be of little use in the orchard.



AN UNDESIRABLE FRUIT LADDER.

Varnish or wax paper is found useful for preventing wounds, caused by the removal of a large limb, cracking and decaying owing to exposure; it also promotes a more speedy healing. For that purpose gum shellac is often used. It is made by dissolving in a little strong alcohol as much gum shellac as will make the varnish of the consistency of paint. This varnish is kept in a well-corked flask, with a mouth wide enough to admit a brush, and is thus always ready for use. It is applied over the cut surface, well pared

with the knife. Other good coverings for wounds made in pruning are also common white lead paint, grafting wax, coal tar, in the order named. The last-named is often a hindrance, while pine tar is even somewhat detrimental to healing.

CUTTING TO A BUD.

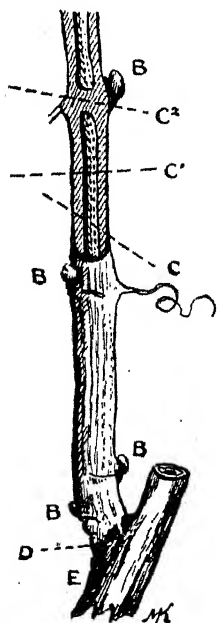
It is important before cutting off a branch of a tree or a rod of a vine to make sure that the last bud left on the plant, and which is intended to prolong the growth of the plant, is a sound, plump one, likely to grow, or whether it has accidentally been rubbed off or otherwise destroyed. Such a terminal bud should be a leaf bud, and not a fruit bud.

Leaf buds differ from fruit buds in being more elongated, flattened, and more pointed in the same species of plants; they are either single, or give growth to single shoots, or double and even triple, when grouped in small clusters, two or three together, as in the case of stone fruits, they produce either leaves or branches.

Fruit buds are distinguished from leaf buds by their rounder and fuller form, the scales that cover them are broader, and they begin to swell and burst open earlier in the Spring.

Fruit buds are also single, as in the case of apples, pears, quinces, or single, double and triple, as in stone fruits and berries. They are, besides, simple or compound; that is to say they produce but one flower, as in the peach, nectarine, almond, and apricot, or two or more flowers, in clusters, as in apples, pears, plums, and cherries.

All buds are leaf buds when first formed; some at a later stage develop, either by being allowed to mature naturally or by artificial means, into fruit buds. Many trees develop their fruit buds towards their terminal shoots, unless these are cut off, when those left at the base of the branch, or along it, are thus excited into growth, and transformed into lateral fruit buds.



When cutting to a bud a slight slant is generally given to the cut, at a place close to the bud, although in so doing it is advisable not to approach the bud too closely, nor on the other hand leave above it a useless stump, which might engender decay; a piece of wood about an eighth of an inch above the bud is sufficient to leave. In the case of the grape vine the practice is often to cut through the joint, above the last bud it is intended to leave on the spur, as shown at C2. A longitudinal section of the young wood of a vine shows in each joint a tubular cavity filled with pith; at each joint or node that tube is closed, as in the case of the bamboo, and if the section

is made at C₁ that pith dries up and the bud below is at times endangered. The section should be made either at C or at C₂ as shown on the fig., and never at C₁. The buds B. are those left on the spur. D is an axillary bud which often fails to shoot. E is a piece of the previous season's wood.

WHEN BEST TO PRUNE.

For the Winter pruning of deciduous trees, May, June, July, and August are the best months. Pruning may be started directly the wood is ripe, when the leaves fade and begin to drop off. It is recommended to give to apricots and cherries a preliminary pruning in the late summer, after the crop has been gathered. Trees thus pruned are less subject to gumming and dying back, and the leaf buds have thus more time to transform into fruit buds, and to perfect themselves.

As a rule older trees are ready for pruning before younger ones.

In frosty localities, where stagnant cold air hangs about hollows and gullies, it is advisable to delay the pruning of vines, peaches, and plants whose sap moves early, until later in the season. This delays the period of active growth, and may save the crop. As regards the grape vine, late pruning is, if anything, also preferable to early pruning, in respect to yield of the crop and earliness of the period of maturity; but of course where wide areas have to be gone through, it is not possible to delay until the right moment this operation.

I.—VINE PRUNING.

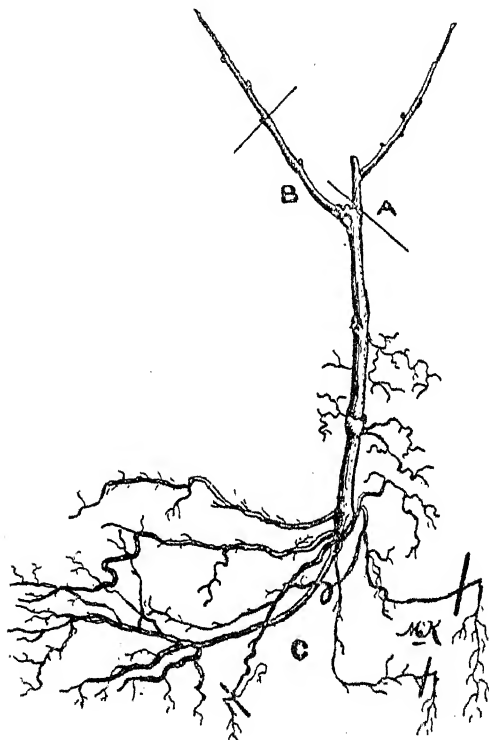
PRUNING AT TIME OF TRANSPLANTING.

In Western Australia, where the Summer season is dry and protracted, rooted vines are more in favor than cuttings when planting a vineyard. The figure (page 318) shows how a typical rooted vine from the nursery bed is cut back previous to planting. The bruised roots are trimmed off, as shown at C, as well also as those fibrous roots along the stems of the rooted vines which, were they are allowed to grow, would be too close to the surface and would in the long, dry summer fail to maintain through the plant the requisite flow of the nourishing sap, and two good buds only are left on the rooted plant to supply the wood and the foliage which the vine will carry the first season of its growth.

PRUNING FOR WOOD AND FOR FRUIT.

Excessive wood growth is detrimental to heavy bearing, but, on the other hand, excessive bearing checks the growth of the vine. The art of pruning consists, in a great measure, in so balancing the productive and the vegetable vigor of the plant that regular average crops are borne annually of good sized, well nourished and healthy grapes.

The shoot from a bud is generally considered good for two bunches of grapes, and a good size vine growing under favourable conditions out in the field may be allowed from one to three dozen buds, these should be uniformly distributed, according to the system



of training adopted, as symmetrically as possible over the vine, the stronger arms being allowed, according to their vigor, more buds than the weaker ones. Sturdy vines trained on overhead trellis may be allowed as many as eighty buds, and even more in particular circumstances.

In connection with the pruning of the grape vine there are several facts which should be borne in mind.

The vine bears on wood of the present season's growth, issuing from a bud on wood produced the preceding year.

The activity of the sap is much greater in those shoots which grow more erect, than on those which are bent down or are trained horizontally; it is also greater towards the extremity of a cane than towards its base.

A bend or a twist to a cane which has a tendency to shoot upwards will, while checking its tendency to excessive wood growth, favor its productiveness.

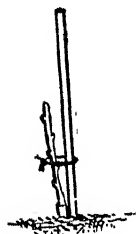
Only leave matured wood, of medium size, and short jointed, in preference to either luxuriant "full canes" or spindly stunted growths with a weak constitution.

A vine with a tendency to "go to wood" should be pruned for fruit, by resorting to either long or to mixed pruning. If on the other hand a vine shows signs of distress and does not make a fair amount of wood, it should be severely pruned so as to reduce the number of the fruit-bearing buds.

Suckers and water shoots should be cut clean out, unless required for renewing the top of the vine, or part of it; these shoots are as a rule sterile.

PRUNING YOUNG VINES.

The aim of the pruner is to form a stem on which to build the framework which will carry the future crop of grapes. The year of planting the growth of the young vine is not interfered with. The subsequent season all the shoots but one are cut off and the remaining one cut back either to a height of 6 to 9 inches, if it is intended to train the vine gooseberry bush fashion, or to a height of 14 to 15 inches if it is meant to train it on a trellis. If a suitable shoot is not procurable, cut the young vine hard back to two buds and train the strongest shoot which will spring from one of these buds erect to a stick or a piece of bamboo set into the ground.



SYSTEMS OF PRUNING.

Pruning and training differ, insomuch as pruning affects the growth and the productiveness of the vine, and the quality as well as the quantity of the grapes, whereas training is purely conventional, and does not affect the growth and fruitfulness of the vine to the same extent. Training varies according to locality and to circumstances, and it is simply adopted for the sake of uniformity, and to facilitate cultivation, dressing the vines and gathering the grapes.

The methods of training are numerous and varied; the several systems of pruning, on the other hand, may be cut down to three main types, according to the length of spurs or of fruiting canes left on the vines, viz., *short*, *long*, and *mixed pruning*.

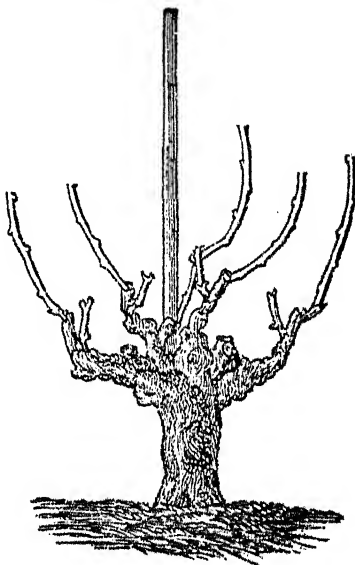
Short, or Spur Pruning consists in leaving on the vines short spurs of one to three buds only--generally two buds. It is applicable to those vines of moderate growth, which fruit most readily from every joint of their fruiting wood. Although the crops are thereby reduced, and the bunches fewer in number, they are in consequence of larger size and more showy.

Long Pruning consists in cutting long one or more of the previous season's fruiting canes. Six to ten buds are left on the canes or rods of these varieties, which only bear fruit on buds situated further away from the crown, the lower buds being mostly sterile,

or not regularly fertile. Should such varieties be pruned short, most of the fruitful buds would be removed, and the result would probably be a luxuriant wood and leaf growth, and a very small crop.

Mixed, or Half-long Pruning: Between these two systems is an intermediate one found useful in the case of vines which have been pruned short, and are planted on rich ground, and run into rank growth at the expense of fruit production. It is also useful in the case of vines which, of the class that is pruned long, fail, through exhaustion and lack of necessary vitality, to carry a full crop of well developed grapes.

As the illustration shows, it is advisable to leave for each longer spur a short one cut back to two buds, whose duty it is to provide wood for the following year. At the pruning following the one illustrated in the figure, the longer spurs are cut off, and a new fruiting spur or cane, together with a shorter wood spur, are selected from the shoots issuing from the wood spur shown in the figure.



GRAPE VINES GROWN IN WESTERN AUSTRALIA.

How to Prune them.

The following list supplies the names of vines which in fairly moist and fertile localities are better pruned short or long. In dry districts, however, it is preferable to be sparing of long pruning and high training and to adhere more closely to short pruning and low bush training. This insures a more rapid and freer circulation of the sap through the channel of the tissues of the plant, and consequently better nourished bunches. In such localities it may be advisable to make up for the low fertility of the basal buds of the canes by multiplying the number of spurs.

Prune short the Rousillon family of grapes, viz., Grenache, Carignane, Mataro, Aspiran, Morastel; also Cinsault, Aramon, Sauvignon vert (Colombar), Semillon, Pedro Ximenes, Folle blanche, Trebbiano, Doradillo, Clairette, Gouais, Zinfandel, the Muscats, Black Hamburg, Cornichon, and a great many table grapes.

Prune long Cabernet Sauvignon, Cabernet franc, Malbec, Merlot, Verdot, Sauvignon blanc, the Pinots, Verdelho, Shiraz, Roussanne (White Hermitage), Riesling, Green Hungarian (Tokay), Malaga, Early White Malvasia (Lignan), Sultana, the Currants.

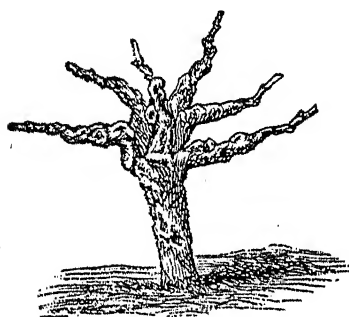
Prune Half-long any of the above sorts, according to circumstances as detailed above, and more particularly Mondeuse, Marsanne (White Shiraz), Chasselas, Muscatel, Sauvignon Blanc, Sauvignon Vert, Merlot, Pinot-Chardonnay, the Port Wine varieties, the Sauterne varieties, Blue Portuguese (Ellilade), Black Morocco, Emperor, Shiraz, Crystal, Almeria, Pedro Ximenes.

METHODS OF TRAINING.

As I have already pointed out, training is merely a matter of convenience. The numerous methods of training may be reduced and grouped under two types :

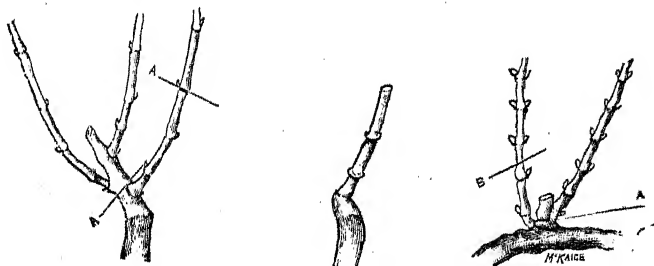
1. Vines growing upright, with or without stalks.
2. Vines trained on horizontal wires or trellises.

First Group : Vines Trained Upright.—To this group belong the Gooseberry Bush, or “Goblet” shape vines, trained according to



this method, and of the class that require short pruning. The single stem, sturdy and straight, having been formed, a fork of two spurs, with two buds on each, is left when pruning the second year, the subsequent season one or two additional spurs are added to these, and so on until the number of spurs is increased to six or eight, in the case of a strong vine. When well-shaped the vines need not stand in the way

of the horse implements, and when the arms become too long, advantage is taken of the presence of any water shoot conveniently situated closer to the stem. This shoot is at pruning time cut back to two buds, and turned into a spur to fill the gap of the longer and older arms, which can then without inconvenience be sawn off or cut hard back.



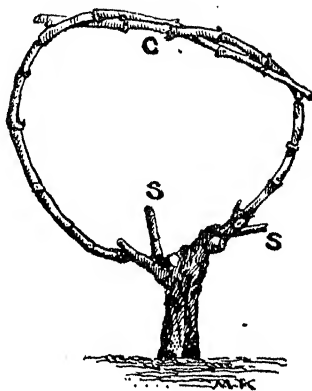
SPUR PRUNING.

A.A. show the points of section and spur left after pruning. Method of pruning wood growing on a short spur, set on a permanent rod. A. and B. show where to cut (Fork).

To this group also belong vines pruned half-long and trained goblet shape. The figure above (page 321) illustrates this method of training.

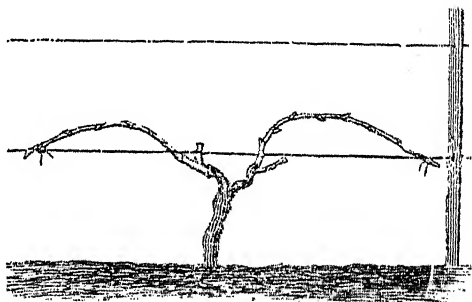
The heavy initial cost of staking or of trellising a vineyard planted with sorts requiring long pruning at times makes it convenient to train vines without support.

The wood-cut alongside illustrates this method of training. One or more long rods (C), with a short wood spur at the base of each (S.), are for this purpose left on the vine, the end of the rods being either bent down and tied to the base of the opposite rod, or the rods are made to entwine together in the form of a bow.



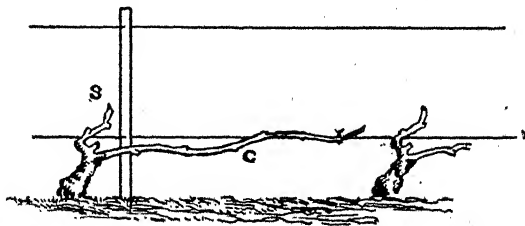
It is customary to leave the long rod above the short wood spur, in order to keep the arms of the vine from rising too rapidly, as the long rods being cut off the subsequent pruning, the wood necessary to continue that method of pruning is found supplied by last season's short spurs.

Second Group: Trellised Vines.—Vines trained on trellises are pruned either with short spurs along permanent rods, or with long fruiting rods. In France, vines trained on wires, with a branch on each side of the stem, are said to be trained *espalier* fashion, in contradistinction to those trained with one main branch only bent on one side of the stem, *cordons* being the term applied to that system of training.



BORDEAUX ESPALIER.

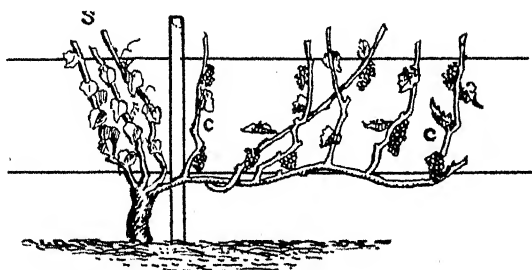
The adjoining figure represents the *Guyot*, *Cordon* and the double *Guyot*, or *Bordeaux Espalier*, is represented above. They



GUYOT CORDON.

are limited to vines which have their fertile buds away from the base of the canes, or those whose basal buds are not regularly fertile.

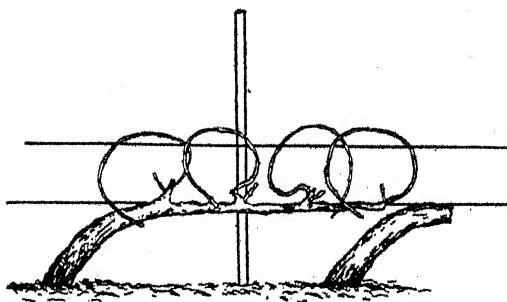
The *Guyot Cordon* consists of a long fruiting cane (C), about three or four feet long, and a short wood spur (S) cut back to two



buds, which is intended to provide the wood necessary for the subsequent season's pruning. When that time comes the cane C is cut clean off, and one of the canes shooting from S is tied down to replace it, whilst another cane from S likewise is cut back to two good spurs, the axillary buds, or half developed buds placed low down on the cane, close to the arm, not being counted.

The *Bordeaux Espalier*, see figure above, is a modification of this system, and one very suitable for such vines as Cabernet, Malbec, and Riesling.

Permanent Rods and Short Spurs is known as the *Thomery Espalier*. This system consists of two main arms set horizontally on each side of the stem along the lower wire. Along those permanent arms spurs are left at intervals of eight to nine inches. The

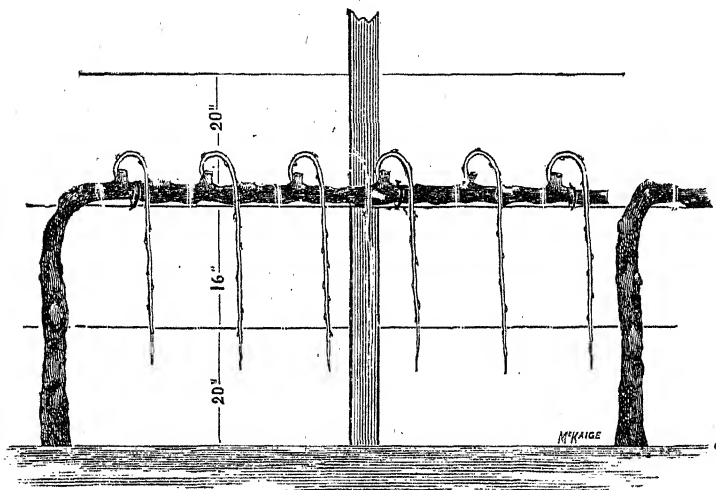


method of shaping the vine it is intended to train as a *Thomery Espalier* has been fully described in the issue for April, 1898, of the *Producers' Gazette*.

The *Cazenave Cordon* is another method of training which has also been referred to in the same issue of that publication. It is a mixed system of pruning, which finds favor with some, and is

suitable for localities where both soil and climate are favorable to a luxuriant growth of the vine. The accompanying figure shows a rather neat modification of that system.

Sylvoz Cordon.—This method of training necessitates three wires. The stem is raised to the middle wire; along its length spurs are left at intervals of about 12 inches, and are pruned to one



bud. The shoot from that bud is sharply bent down and tied to the lower wire. At pruning time the first shoot from the basal bud is bent down to replace the previous season's wood, which is cut close to it. This system of pruning is better adapted to such vines as the Currant and Crystal, which require much wood, and to vines requiring long pruning, which are growing on deep, moist and fertile soil.

CODLIN MOTH NOTES.

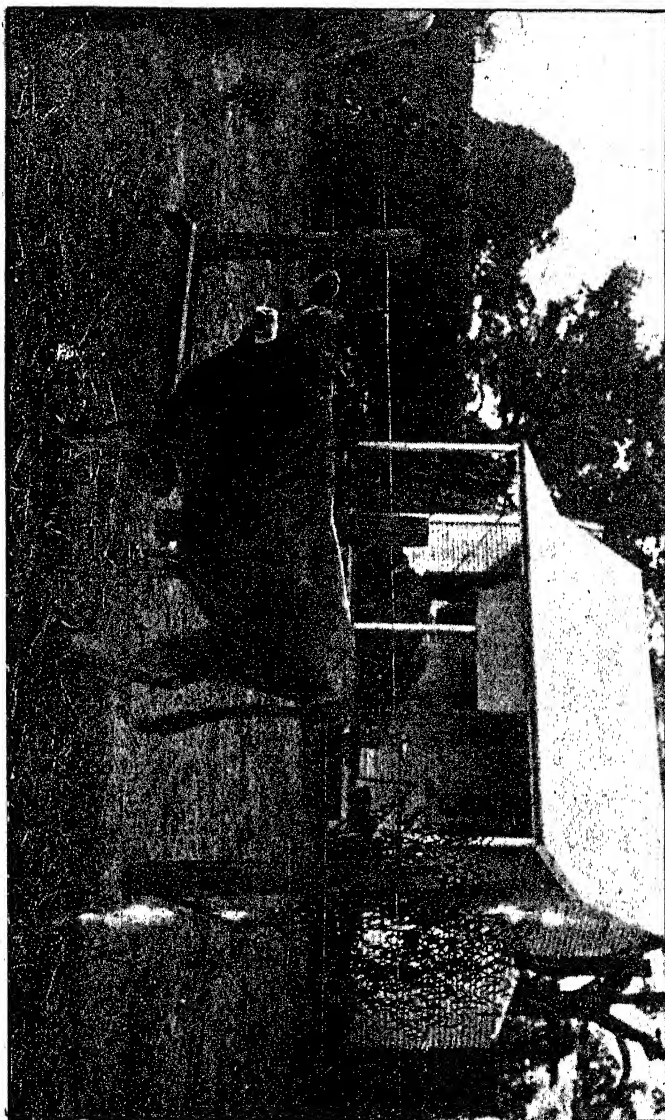
Mr. A. M. Lea, Government Entomologist, Tasmania, writing from Hobart under date 26th March last, says:—

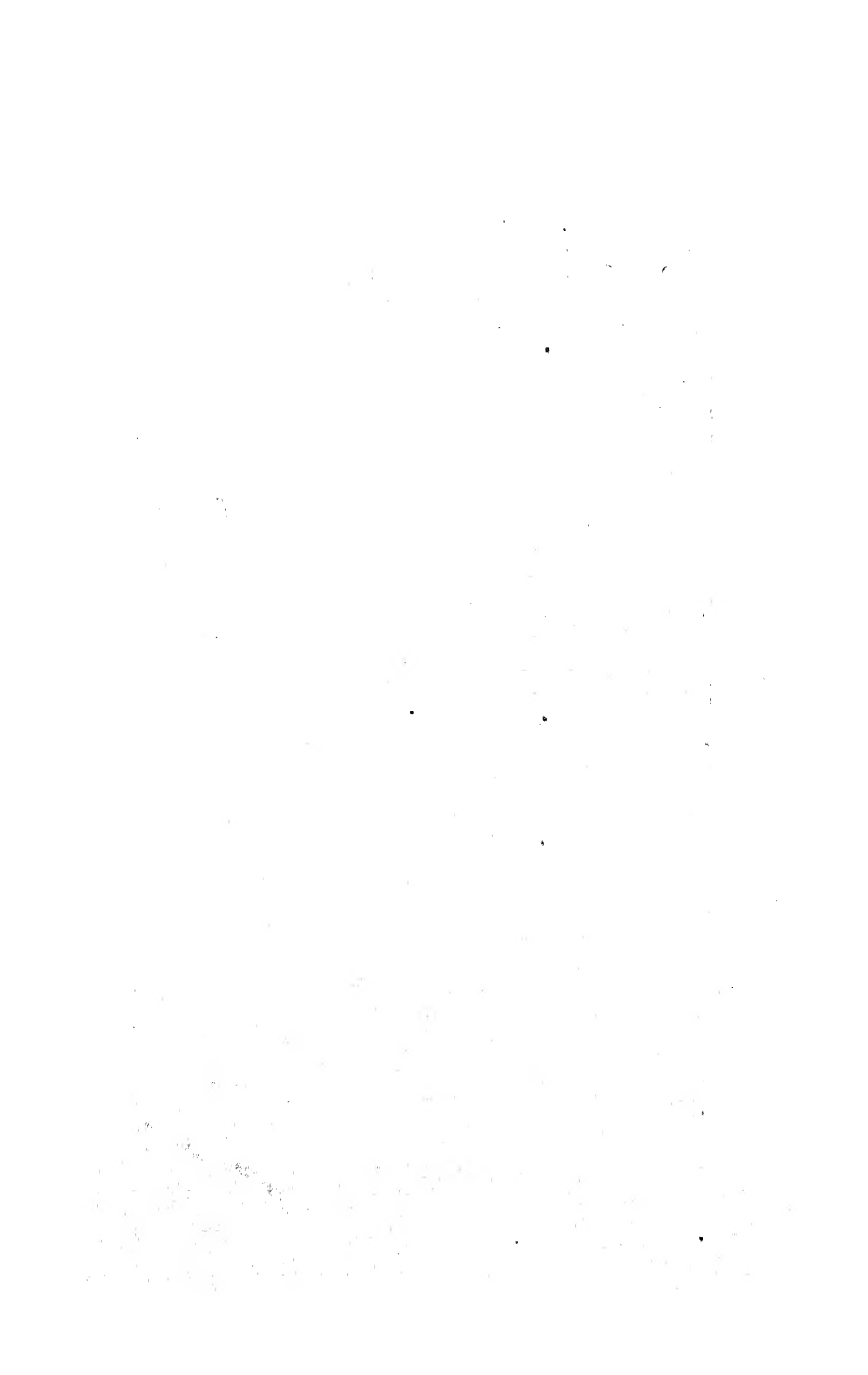
"Have just finished the season's picking for Codlin Moth in my experimental orchard. From 244 bearing trees, 35,294 grubby apples were picked, figures will be published shortly."

Mr. A. Despeissis, commenting on this, says:—

"The promised report should be instructive, and give some definite idea respecting the amount of damage done by that moth. The 244 bearing trees selected for the experiment would cover two acres if planted at a distance of 19 feet square; the average number of grubby fruit per tree was 12 dozen, or for apples of medium size, over half a bushel case. The loss to the grower, through the agency of the Codlin Moth above is thus seen to be sixty cases to the acre, which is equivalent to from one-fourth to one-third of the average yield of an apple orchard in good bearing."

"FOWLER BOY," REARED WITHOUT MILK.
(See Page 398.)





REPORT RE TRIP TO BALINGUP AND BUNBURY.

Mr. P. G. Wicken, Field Officer of the Department of Agriculture, reports:—I have to report having visited the Balingup Agricultural Society, and delivered an address on the subject of manures. Tuesday, April 30, was a pouring wet day, but it was impossible to put the lecture off, as there was no means of letting people know. It cleared up at sundown, and I gave an address from 8 to 10 p.m. The attendance was 16—not so bad considering the weather. The following day and part of Thursday I spent among the settlers in the district. My visit to both here and Boyup Brook appeared to give satisfaction to the settlers, and I have been asked to visit both places again at a future date.

I arrived at Bunbury on Thursday evening, and visited Mr. Hamilton's farm at Glen Iris. He is quite prepared to undertake to carry out some experimental work in the Spring if I forward him the seeds. This I will do in due course. I also visited the establishments of Mr. Rose and Mr. Kirton on Friday, and on Saturday, by special request, I visited Mr. Snell, the District Superintendent of Railways, who has a small garden, in which he grows a little of everything.

OUR PRODUCTS AND IMPORTS.

Below is given a table of what has been produced in this State for the years 1896-9, and also what has been imported during the last five years. A glance will show that for years to come our farmers will have all they can do before reaching the exporting stage.

WHAT W.A. IMPORTS AND WANTS TO PRODUCE:		WHAT W.A. PRODUCE.	
	Value £.	1888	1899
Wheat—		Wheat—	
76,985 (bush.) ...	11,446	570,900 (bush.) ...	968,600
Flour—		Flour—	
9,994 (tons) ...	66,028	8,460 (tons) ...	10,042
Barley—		Barley—	
22,960 (bush.) ...	3,175	29,295 (bush.) ...	56,587
Oats—		Oats—	
676,972 (bush.) ...	77,553	55,854 (bush.) ...	73,555
Chaff—		Hay—	
2,091 (tons) ...	8,298	77,297 (tons) ...	70,078
Wine (Still)—		Wine (Still)—	
57,426 (gals.) ...	21,733	89,099 (gals.) ...	110,799
Beer—		Beer—	
536,905 (gals.) ...	77,823	3,278,008 (gals.) ...	3,373,642

WHAT W.A. IMPORTS AND
WANTS TO PRODUCE :

Spirits—

307,008 (gals.) ... 126,394

Fruits (Dried)—

1,224,180 (lbs) ... 16,890

Malt—

95,135 (bush.) ... 46,748

Poultry (Imported) for Table—

Year.	Value £.
1896 ...	3,796
1897 ...	3,218
1898 ...	2,059
1899 ...	1,486
1900 ...	1,529

Pigs (Imported)—

Year.	No.	Value £.
1896 ...	5,670	8,181
1897 ...	7,896	9,246
1898 ...	8,863	11,724
1899 ...	4,322	5,985
1900 ...	5,706	5,776

Sheep (Imported)—

Year.	No.	Value £.
1896 ...	44,264	27,642
1897 ...	113,998	97,002
1898 ...	81,531	59,892
1899 ...	88,338	85,736
1900 ...	89,844	64,840

Cattle (Imported)—

Year.	No.	Value £.
1896 ...	7,786	72,950
1897 ...	12,306	119,078
1898 ...	16,028	170,059
1899 ...	7,921	78,694
1900 ...	12,309	113,439

Hams and Bacon (Imported)—

Year.	No lbs.	Value £.
1896 ...	2,351,176	68,182
1897 ...	2,681,948	78,148
1898 ...	2,582,678	78,935
1899 ...	2,837,144	83,970
1900 ...	3,342,599	97,051

Butter (Imported)—

Year.	No. lbs.	Value £.
1896 ...	3,190,509	148,971
1897 ...	3,877,427	185,478
1898 ...	4,102,312	195,467
1899 ...	4,425,820	184,329
1900 ...	4,834,917	294,457

WHAT W.A.
PRODUCES.

Spirits—

Nil. ... Nil.

Fruits (Dried)—

Nil. ... Nil.

Malt—

35,000 (bush.) ... —

Poultry (Produced)—

Year.	No.
1896 ...	203,912
1897 ...	259,992
1898 ...	296,383
1899 ...	350,257

Pigs (Produced)—

Year.	No.
1896 ...	31,154
1897 ...	31,809
1898 ...	39,438
1899 ...	55,953

Sheep (Produced)—

Year.	No.
1896 ...	2,248,976
1897 ...	2,210,742
1898 ...	2,251,548
1899 ...	2,282,306

Cattle (Produced)—

Year.	No.
1896 ...	199,793
1897 ...	244,971
1898 ...	269,947
1899 ...	297,075

Hams and Bacon (Produced)—

Year.	No. lbs.
1896 ...	250,790
1897 ...	237,102
1898 ...	154,267
1899 ...	196,096

Butter (Produced)—

Year.	No. lbs.
1896 ...	243,508
1897 ...	270,897
1898 ...	264,640
1899 ...	294,577

WHAT W.A. IMPORTS AND
WANTS TO PRODUCE :

Cheese (Imported)—

Year.	No. lbs.	Value £.
1896 ...	885,795 ...	30,118
1897 ...	970,417 ...	20,300
1898 ...	1,005,357 ...	21,058
1899 ...	929,480 ...	19,036
1900 ...	991,667 ...	23,257

Honey (Imported)—

Year.	Tons.	Value £.
1896 ...	163,135 ...	2,831
1897 ...	135,912 ...	2,230
1898 ...	173,230 ...	2,952
1899 ...	142,278 ...	2,145
1900 ...	130,038 ...	2,071

Potatoes (Imported)—

Year	No. lbs.	Value £.
1896 ...	8,285 ...	53,601
1897 ...	11,992 ...	43,795
1898 ...	8,475 ...	69,430
1899 ...	8,966 ...	28,130
1900 ...	8,484 ...	24,570

Onions (Imported)

Year.	Tons.	Value £.
1896 ...	1,576 ...	10,620
1897 ...	2,106 ...	13,545
1898 ...	1,694 ...	11,887
1899 ...	1,953 ...	8,801
1900 ...	2,066 ...	8,062

WHAT W.A.
PRODUCES.

Cheese (Produced)—

Year.	No. lbs.
1896 ...	1,390
1897 ...	612
1898 ...	704
1899 ...	332

Honey (Produced)

Year.	No. lbs.
1896 ...	82,225
1897 ...	93,948
1898 ...	47,487
1899 ...	72,547

Potatoes (Produced)—

Year.	Tons.
1896 ...	2,089
1897 ...	4,270
1898 ...	5,698
1899 ...	8,372

Onions (Produced)—

Year.	Tons.
1896 ...	144
1897 ...	152
1898 ...	245
1899 ...	349

COOL STORAGE FOR EGGS.

BY A, CRAWFORD.

A series of experiments have been carried out at the Government Refrigerating Works to test the keeping qualities of eggs when kept at a low temperature. The eggs tested were not specially packed, but were bought in the sale room in the ordinary way. Had they been selected and all known to be fresh, the result in some cases would probably have come out better. A number of different ways of preparing the eggs were tried, viz., in chaff, in patent wire boxes—coated with vaseline, coated with linseed oil, and coated with lard. These all were subjected to the same conditions as to temperature. Another thing that militated against the test was that when the National Show was on the eggs were sent to it and had to remain all day at a temperature of between 80 degrees F. and 90 degrees F. But even in the face of this, the test has been most successful in showing what may be done by the use of cold storage alone.

On the 19th of October, 1900, Mr. Gresham, the manager of the works, put down two boxes of eggs, one lot packed in chaff and the other in the patent wire carrier boxes. These were opened, and all examined on the 7th of May, 1901. The time they were stored was a little over six months and a half, much longer than they would require to be stored under ordinary circumstances.

The eggs were stored in one of the ordinary rooms, where the temperature varied from 32° F. to 48° F., the latter temperature having only been reached once or twice.

The results were as follows: Eggs packed in patent boxes with wire carriers came out perfectly fresh looking; 91·4 per cent. were good, and could scarcely be distinguished from fresh eggs when cooked.

In boiling 2·8 per cent. of them cracked in the shells but no yolks broke. In poaching them 5·6 per cent. of the yolks burst.

These turned out the best of any.

The next lot were put in on the same date, packed in dry chaff. All these smelt more or less musty, 84·8 per cent. were good, 6 per cent. were bad, and 10 per cent. cracked their shells in boiling. In poaching 8 per cent. of the yolks burst, and 6 per cent. of them burst the yolks when boiling.

Their appearance was good, but the musty smell strong.

The next lot were put into the rooms on December 14th, 1900, and opened May 7th, having been four months and three weeks in the chambers. These were treated with preparations to make them keep. The first lot were coated with vaseline with the following result:—They looked greasy; 85 per cent. were good, 2 per cent. bad, 4 per cent. were cracked, and 9 per cent. burst the yolks in boiling.

The next lot were coated with linseed oil. These all smelt strongly of the oil and were the worst; 41 per cent. were bad and only 59 per cent. good, 14 per cent. burst in the boiling.

The method of testing was first to examine the general appearance of the egg and see if the shell was sound, whether or not there was any odour coming from the egg. The lots were then divided and half of them boiled and half poached. The boiled ones were then examined to see what proportion, if any, cracked in the boiling, and each egg was cut in halves and the interior examined, as to the bursting of the yolks and condition of the white of the egg. Only two classes were made, good and bad, and if an egg was not really good it was condemned as bad, although many of the latter would have been quite eatable.

When the season next comes round, and eggs are cheap and plentiful, Mr. Gresham (the manager) will be prepared to receive eggs for storage, and if they are properly gathered and packed there is little doubt about their turning out in good condition at the end of three, four, or even six months.

The value of this method of storing eggs is fully realised in New South Wales where two years ago 11,000 dozen were sent in for cool storage, and the persons sending them in were so pleased that the following year 93,000 dozen were sent in.

When sending eggs in the greatest care should be taken in gathering them. They should be gathered at least twice a day, as if the eggs are sat on by one hen after another while laying, or the days are very hot, if the eggs are fertile germination is almost sure to start and then the egg will not keep. The best eggs for preserving are infertile eggs. In fact where eggs only are wanted, and not chickens, the hens are much better not to have a cock running with them at all. They will lay more eggs, and the eggs, without cold storage or any other preparation, will keep fresh double the time that the fertilised eggs will. As to the best method of packing, and the most suitable sizes for cases, further information will be given in another issue.

REPLIES TO RESOLUTIONS AT THE NINTH ANNUAL CONFERENCE OF PRODUCERS.

RAILWAY RATES AND PRODUCE TRAINS.

RESOLUTION :—"That in the opinion of this Conference the resolutions of previous Conferences in reference to railway rates, not having been given effect to, the Minister of Railways be urged to at once have the rate book revised by the insertion of the words 'and garden produce,' on lines 2 and 20 of page 47, and that 'special fast produce trains should be run from the coastal districts to the eastern goldfields on fixed dates, as traffic warrants,' and that a deputation from this Conference wait upon the Minister for Railways to urge that the resolution be at once given effect to."

The Under-Secretary for Railways replies :—1. "*Rates for Agricultural Produce.* The five ton lot rate may be availed of at all times, whether the actual weight is less. Garden produce is a better article to deal with than chaff, and warrants a higher rate, and the Minister cannot agree to any reduction. 2. *Perishable goods sent to the Goldfields.* The 3.25 p.m. train is available every day (Sundays excepted), but we could not agree to reduce the rates on perishable goods by the train in question. 3. *Differential Rates.* The Minister regrets that he cannot make any alteration. The existing rates are very low, and all in favor of the producers."

NOXIOUS TRADE AREAS.

RESOLUTION :—"That in the opinion of this Conference the Government should encourage the manufacture of artificial fertilisers within the State by declaring areas upon which such trades may be conducted."

The secretary to the Premier's Department has replied that in the opinion of the Premier the resolution is somewhat vague, but he is of opinion that, where necessary, the Government would be quite willing to declare such areas.

PRUNING FRUIT TREES.

RESOLUTION:—"That in the opinion of this Conference a Government Expert should be appointed to travel the south-west portion of the State to give practical illustration on the pruning of fruit trees."

The Minister of Lands has replied that an effort will be made to give effect to this resolution as soon as possible. In the meantime the services of the Horticultural Expert are available to societies and groups of individuals, if application is made to the Department.

USE OF LAND REVENUE.

RESOLUTION:—"That in the opinion of this Conference the Government should be asked to devote 5 per cent. of the land revenue to the direct assistance of agricultural progress, percentage to be calculated on the average of last three years' revenue."

The Minister of Lands has replied that he cannot see his way to make such a recommendation to Parliament, but is prepared to directly assist the agricultural industry in every way possible.

WEIGHBRIDGES AT STATIONS.

RESOLUTION:—"That in the opinion of this Conference all railway stations should be supplied with a cart weighbridge."

The Under-Secretary for Railways replies:—"I am directed to inform you that the matter has received the careful consideration of the hon. the Minister for Railways, who now replies to the effect that he cannot at present agree to additional cart weighbridges being put down at the railway stations."

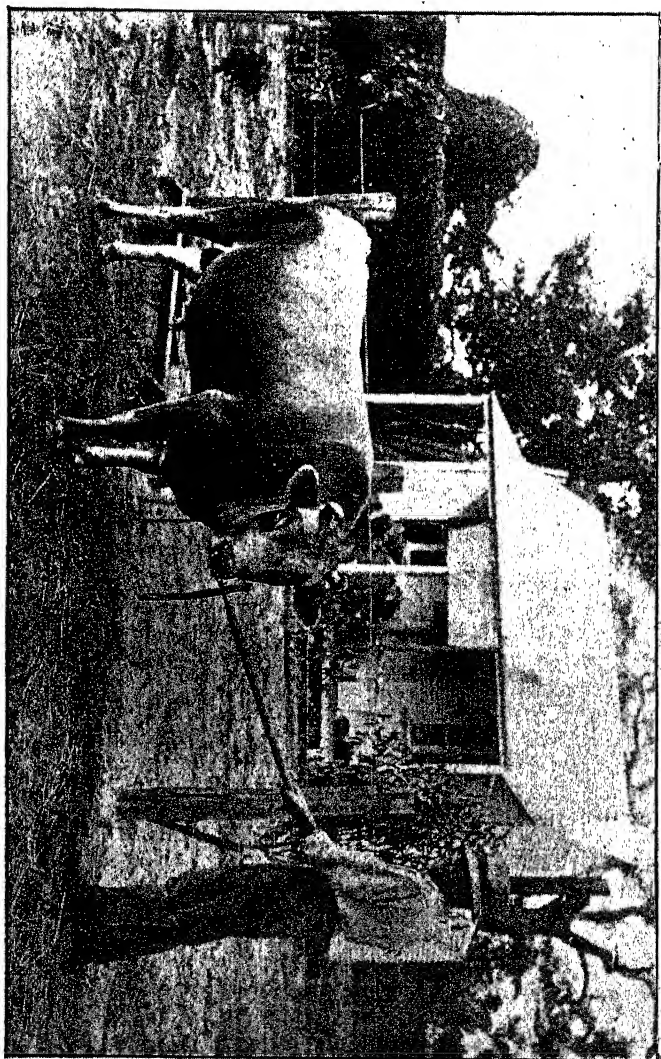
TESTING WEIGHBRIDGES.

RESOLUTION:—"That in the opinion of this Conference it is desirable that the Government instruct the Inspector of Weights and Measures to make provision for the maintaining of the accuracy of the weighbridges at railway stations."

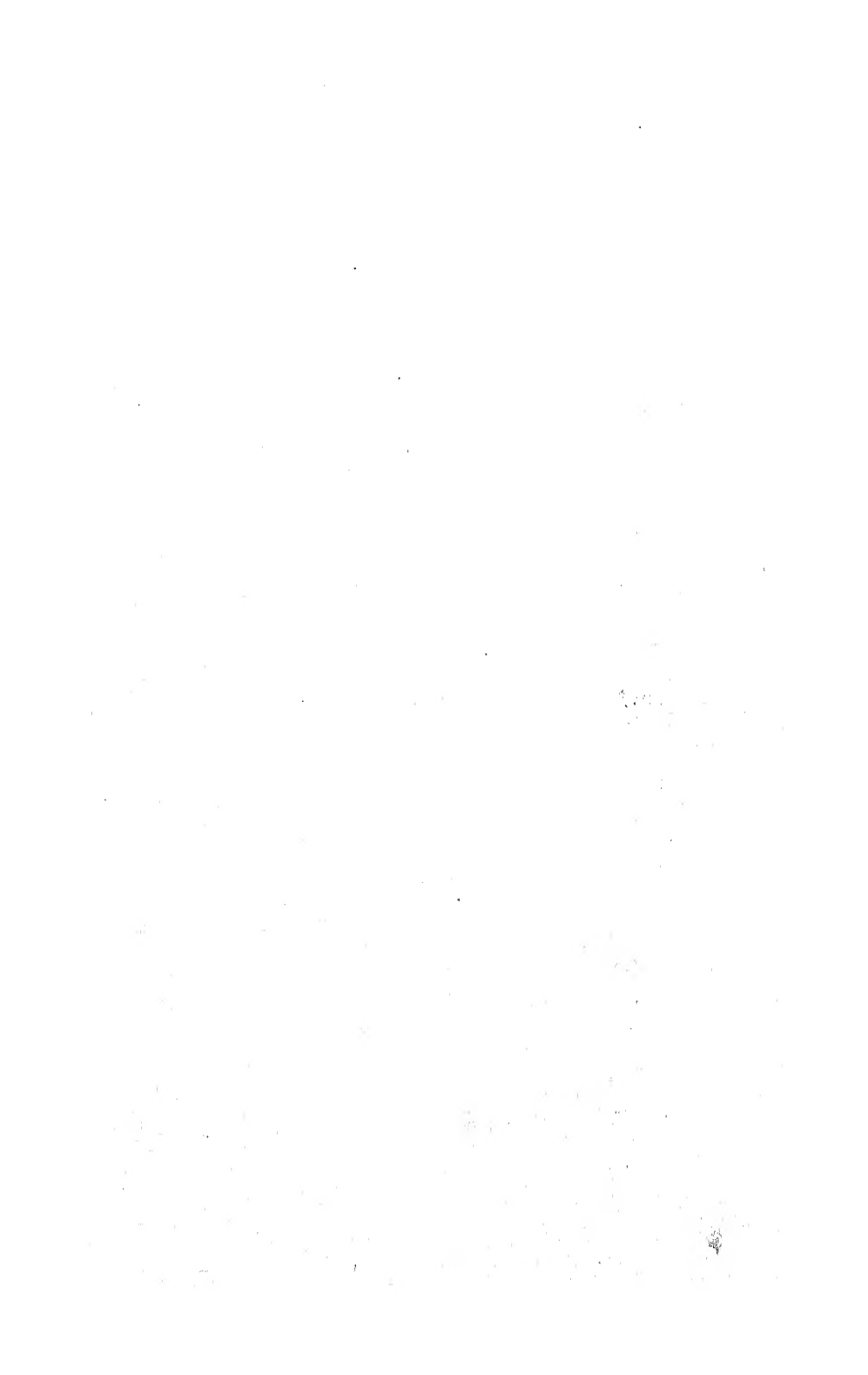
The Under-Secretary replied as follows:—"The question of testing the railway weighbridges has recently had most careful attention, and, as they are regularly inspected by our qualified inspectors, my Minister sees no reason why the suggestion made by the conference should be adopted. As you are doubtless aware, this subject has had special attention from the general manager of late. The question of weighings, re-taring waggons, etc., is having every consideration, and we are improving our facilities in this direction. The general manager has arranged for a special clause being inserted prominently on the tickets (weighbridge) that our weights are not for buying and selling purposes."

RECEIPTS FOR GOODS.

RESOLUTION:—"That in the opinion of this Conference the Railway Department should be required to give receipts for goods handed in at sidings."



"FOWLER LAD," Reared Without Milk.
(See Page 311.)



The Under-Secretary for Railways replies:—"This matter has had the consideration of the Minister for Railways, and I am directed to say that, while he cannot approve of Guards giving receipts for goods which they are unable to check, there would be no objection to giving a receipt for truck loads when quantities are not stated, and instructions to this effect have been issued."

CANNING JARRAH RAILWAY.

RESOLUTION:—"That in the opinion of this Conference it is desirable that the Government purchase the Canning Jarrah Company's Railway."

The Under-Secretary for Railways replies:—"The General Manager has the question of delay to consignments at Midland Junction in hand."

BURNING OFF ON RAILWAY LINES.

RESOLUTION:—"That in the opinion of this Conference the present method of burning the grass on railway lines in agricultural districts is positively dangerous, and should be done before the crops are ripening; and further, the Conference is of opinion that burning on hot days is particularly dangerous."

The Under-Secretary for Railways replies:—"This matter is having every attention, and the Minister is advised that no more can be done than is being done at present."

RE-VALUATION OF SUBURBAN BLOCKS.

RESOLUTION:—"That in the opinion of this Conference the Government should re-value suburban blocks throughout the State, with a view to reducing the price, many of them being too rocky for cultivation, and fit only for paddocks for stock."

The Under-Secretary for Lands, in his reply, stated that the Government were not prepared, at the present time, to re-value suburban lots throughout the State, but in any particular case where the Minister is satisfied that the values are too high, he would be ready to recommend suitable reductions.

STOCK ROUTES.

RESOLUTION:—"That in the opinion of this Conference it is desirable that stock routes from distant centres to nearest railway stations should be surveyed, and cleared of poison by Government."

The Under-Secretary for Lands has replied, stating that the declaration of stock routes is part of the policy of the Government, but that the Department had not sufficient funds available to survey and clear the routes of poison.

POISON PLANTS ON RESERVES.

RESOLUTION:—"That in the opinion of this Conference it is desirable that all reserves should be cleared of poison plants."

The Under-Secretary for Lands has replied, stating that the Minister considered it a matter involving so great an expenditure that he preferred to lay it before Parliament for decision.

REPORT OF THE SECRETARY OF AGRICULTURE, UNITED STATES OF AMERICA.

The annual report of the Secretary of Agriculture is a most interesting document. It is devoted to a brief résumé of the important work carried on by the various Divisions. Important extensions of the Weather Bureau work have been made during the past year. Its efforts have been specially directed to the investigation of methods of electrical communication without wires, with a view to establishing wireless electrical communication between vessels at sea and exposed points on our lake and sea coasts. Already messages have been successfully transmitted and received over sixty miles of land, and the Secretary expresses the hope that in the near future the craft employed in our coastwise commerce and on the Great Lakes will be placed in instantaneous communication with the stations of the Weather Bureau located at the principal ports. Special storm forecasts for the North Atlantic will be undertaken shortly through the use of reports received from the West Indies, Bahamas, Bermudas, the Azores and Portugal, the new cable system connecting Lisbon with America, via the Azores, making this possible. Much stress is laid on the continued improvement of the forecast service, and the value of its warnings. Mr. Wilson points out that notwithstanding the great number of craft plying the Gulf of Mexico at the time of the Galveston storm, the warnings were so timely that there was no disaster upon the open waters.

The Bureau of Animal Industry has carried on its highly important work, and the total number of cattle inspected before killing aggregated 53,087,994, in addition to an inspection of 34,737,613 animals which had been killed. The total number of carcasses condemned was 61,906, and the number of live animals rejected was about 160,000; 999,554 microscopic examinations of pork were made. During the season of 1899 over a million cattle were moved, under the supervision of the Bureau, from the districts infected with the southern cattle tick. Over 1,800,000 sheep were inspected, and nearly 627,000 dipped under the supervision of the inspectors. The work of preparing serum for various diseases has also been carried on. With regard to rabies, the Secretary declares that the disease is unfortunately on the increase in the United States.

The Division of Chemistry has carried on important work in the investigation of food adulteration; over 500 samples of preserved meats of all kinds were purchased in the open market, and examined. The Division finds that very little horse meat is sold in the United States. The foreign food products introduced into this country have been the subject of careful study.

Most satisfactory reports are received from California as a result of the entomological work in the introduction of the insect

which fertilizes the Smyrna fig. In one locality more than six tons of Smyrna figs have been produced ; this result will tend to make America a great competitor in the fig trade of the world's markets. An important parasite has been introduced to prey upon the olive scale, so injurious to the olive growers of California. From Natal a fungus disease has been introduced by which the injurious worms and locusts have been destroyed, and efforts are being made to introduce European parasites of the gypsy moth.

The results of seed testing are declared to be satisfactory, and to have greatly improved the quality of seed distributed by Congress. Experts of the Division have been studying plants poisonous to stock in Montana, and valuable experiments will be conducted on the ground set aside for the use of the Department on the Potomac flats at Washington. The section of seed and Plant introduction receives a special notice, stress being laid particularly upon the importation of cereals, including macaroni wheats of southern Europe and grasses and forage plants. The Kiushu rice introduced from Japan has already added one million bushels annually to the Louisiana rice crop. The introduction of date trees into Arizona is another valuable achievement. The introduction of wheats from Russia, Hungary, and Austria is being watched with great interest, and if the wheat yield of the United States should be increased by only one bushel per acre, this would mean at the farm price of wheat in 1899 an addition of \$26,000,000 (£5,200,000) to the income of the farmers. The Division of Vegetable, Physiology and Pathology has also been carrying on important investigations. In plant breeding, orange hybrids have been placed at various points in the South, and their value has been tested in co-operation with several experiment stations. In corn breeding the features aimed at are early maturity, drought and smut resistance, increased protein content and a large yield. Diseases of sugar beet have been investigated, also diseases of forest trees.

The Division of Pomology made a most interesting exhibit at the Paris Exposition, which attracted wide attention. A special effort has been made to give a thorough test to the cultivation of choice European grapes in the South Atlantic States. The work of the Division of Agronomy has been thoroughly systematized. The grass garden on the Department grounds contains nearly 500 varieties. The destruction of prairie dogs has become a practical question of interest to farmers, and is being investigated by the Biological Survey. Warning is given of the possible danger of the introduction and dissemination of the Belgian hare. Laboratory work and the study of food of birds of economic importance have received attention. The work of the Soil Survey has been greatly increased, but still falls short of meeting the demand for soil surveying from all sections of the country. The work of this division with tobacco is specially noticeable. The tobacco exhibit

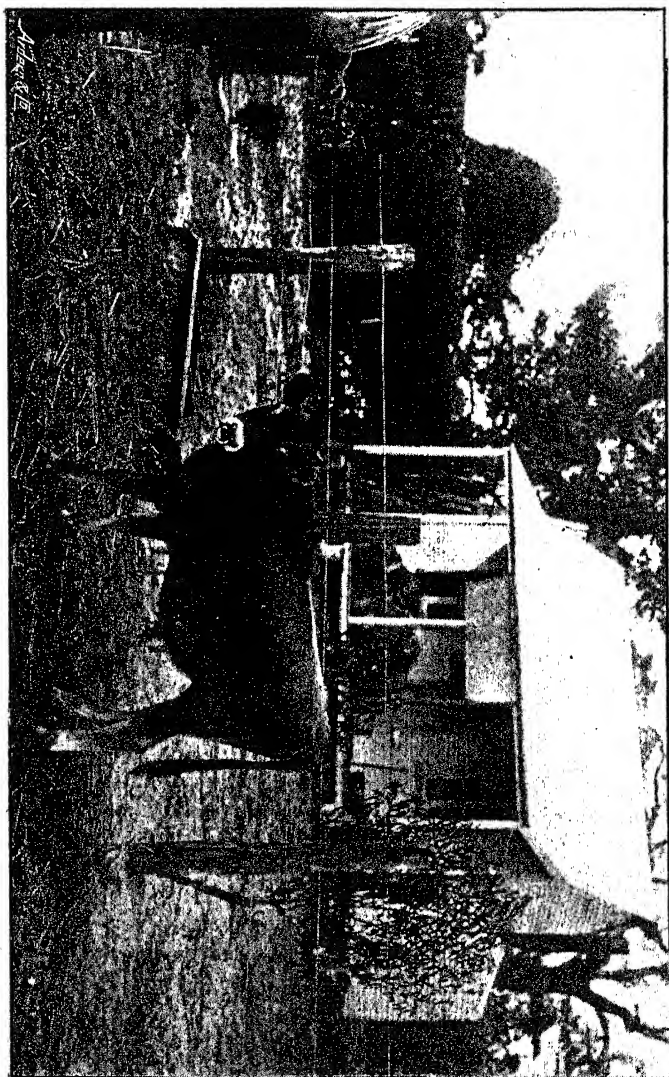
at the Paris Exposition was one of the largest as well as one of the most complete made, containing over 2,000 samples. Florida-grown Sumatra tobacco was awarded twenty points of merit against eighteen points for real Sumatra, leaf and the yellow tobacco of North Carolina was awarded as many points as the Turkish tobacco with which it competed.

The relations of the Division of Forestry with practical lumbermen and tree planters have been closer and more useful than ever before. The total requests for working plans for scientific forestry exceeded fifty million acres. The Department is receiving with increased frequency applications for planting and working plans for watersheds from which cities obtain their supplies. There is much inquiry in all sections of the United States regarding better roads and better methods of building them. Much work has been done by the Office of Road Inquiry, and in co-operating with colleges and stations.

The Secretary reviews at considerable length the work of the experiment stations first established in that country twenty-five years ago. The stations now employ nearly 700 persons, and in 1899 their publications aggregated 445 reports and bulletins. The study of foreign markets abroad, with special reference to extending the trade therein, for the agricultural products of the United States has been prosecuted with zeal and intelligence. The agricultural exports for the United States for the past fiscal year amounted to 844 million dollars (£168,800,000). The rapid growth of our export trade to the Orient in recent years is most striking. In 1900 our export trade to the Orient amounted to 107 million dollars (£21,400,000). The Division of Statistics and the Division of Publications both carried on their labours with the most satisfactory results. The annual output of publications was 7,000,000. Notwithstanding the enormous amount of work which the Department carries on, the appropriations for the fiscal year amounted to only 3,006,022 dollars (£601,204 8s). In addition, the sum of 720,000 dollars (£144,000) was provided for division among the agricultural stations at the Paris Exposition; American exhibitors in agriculture, horticulture, and food products received about 500 awards.

PHYSIC COLTS.—Once a week give each colt a tablespoonful of sulphur in bran. This will keep them from worms and ward off lice. Examine colts carefully once a week to see that they are free of vermin. When a colt gets lousy he will do no good until relieved of the pests.

WATER FOR COWS.—The truth is, the cows that are giving milk not only require a considerable amount of water, but they need it often. The process of making milk is one that goes on constantly, and as this fluid is so largely composed of water, enough of the latter should always be within reach.



"LILLIAN'S PROGRESS," REARED WITHOUT MILK.
(See Page 308.)



AN UP-COUNTRYMAN'S THEORY ON GENERAL STOCK BREEDING.

Continued.

Shakespeare's dictum, "There are more things in heaven and earth than are dreamed in our philosophy." We constantly are meeting surprises in breeding with all kinds of stock. The more violent they happened to be the more frequent do we meet with them. The reason I instance so many illustrations from the Stud book is because they are authentic, and easily verified, though equally as applicable to all kinds of "stock," horses, cattle, sheep, and pigs.

As to Age.—The dams of all stock show great diversity in their successes in breeding, the old age frequently producing the best of their progeny, and others again at extremely early age; so it is with some sires. In horses the greatest number of successes are between "extremes," when they produce the best of the series. In extreme old age I mention a few cases. Priam, a most successful sire, was out of Cressida at 20 years old, the celebrated Crucifix, from Octavina, at 22, and Voltair sired Voltiguer at 21. And in all kinds of other stock, if other essentials are favourable, such as health, etc., it is not so very detrimental to success as some imagine, more especially in sheep, as in many cases broken mouth ewes on good succulent pasture frequently cut the biggest percentage and the finest lambs on the station. Still extremes are not generally successful. In many cases first foals are the best of the series, and seldom in extreme youth, if on both sides, as was the case of Monstrosity, who produced Ugly Buck at three years of age, while the sire Venison was himself only 7; and her dam was only one year older. Certainly it is many years ago (1838), but there has been very few cases where this extreme has produced any exceptionally good animal recorded since then. The "golden mein" is in stock breeding, as in most other businesses, generally the most successful. All horse stock require ample room to exercise themselves from their birth to properly develop their activity's health.

Cattle.—Whoever heard of cows dying, whilst rearing their calves on a run, of paturient apoplexy? Though how frequently it occurs with deep milkers, when they are not allowed to rear them from birth, especially after their second calving. I know it is heterodox to say the calf should be left with its mother for at least ten days after calving before weaning; but to insure the cow from the danger of paturient apoplexy, generally called milk fever, especially with the third or subsequent calving with deep milkers, when the calf is at once taken from the cow. It should be allowed to suckle till then, then fed on whole milk, gradually adding to the ration sweet skim milk, as the whole milk is being reduced, adding linseed boiled in skim milk to a jelly, if procurable; if not, substi-

tute meal, oat, barley, wheat or maize, and increase the quantity of meal as the calf gains strength, always feeding at blood-heat at least three times a day—oftener the first fortnight. The nearer you follow nature the more successful you will be. The cow herself feeds her calf little and often. If this course be not adopted diarrhœa may supervene, or the calves become pot-bellied. The quantity should be about eight pints, gradually increasing the ration in equal feeds. To replace the butter fat to the skim milk in a very cheap way and reducing the quantity of meals, otherwise so necessary, is to boil in some of the skim milk an equal proportion of clean sweet fat or suet, as the butter fat would have represented, and mix it with the ration of milk. This is a very satisfactory way of feeding the calves, and the most economical way of all feeding hand-reared calves. As soon as possible the calves should be encouraged to eat hay or green stuff, and then weaned on to a bit of good pasture, at any rate part of the day time, and as early as possible entirely so. Though it is not so absolutely necessary with cattle as with horses to have roomy paddocks to run in in their early life, still plenty of exercise is essential to develop their conformation, and give them health and vigour. It is with ample surroundings that the calf is built into the cow.

The castrating, if not the branding, should be done when the calf is about six weeks old. A few days more or less will not matter, but pick fine and settled weather for the operation. Later on a small brand must be used, for the brand grows with the calf. Ear-marking can be done before or afterwards, but it should be on a principal to denote why. That, as published in *The Australasian* some time back, was admirable, and, if requested, would most likely republish, or furnish you the number of the issue. The branding should, where possible, be made on the cheek, neck, lower thigh or arm, as any other conspicuous place is injurious to the hide, and the parts specified are visible enough if properly done. When about a year old the heifers that are not intended to be kept for breeding purposes should be "spayed" by an expert hand, either by removing the ovaries, or, still better, excise the follopian tube.

A breeding establishment never should be without a man competent to rope, throw, brand, castrate, spay, or administer a ball or a drench, quickly and efficiently, and also use a troca and a needle, or perform any minor operation. The heifers should be put to the bull at or about two years old, perhaps a month or two earlier as they are wanted to "come in" where they are intended for the dairy. The bull should come from stock of the highest milking strain and heavy percentage of butter-fat procurable, of healthy, vigorous, active nature; secondly of a good color and coat. You will find these externals, as with the other points, transmitted by the bull to his offspring; more especially his defects, or those of the family he comes from.

Dehorning.—As soon as the button begins to show the hair should be cut away, and the point dressed with diluted liquid ammonia twice. Then apply a stick of caustic potash, the point being previously dipped in water, taking care not to let any get on the hands. The part to be destroyed should be rubbed every day with a hard brush before the next application of the caustic. Previously to using the above the cheeks should be greased, to prevent them being excoriated if the potash runs down the face. Dehorning, which can even be done with grown cattle, with but little pain, as is seen by the beast as soon as it can get feed, commencing to eat as if nothing had happened, which, if it had been a painful operation, it would not do. By dehorning you make a polled herd—a most desirable thing for a dairy. Horns are only given for offensive and defensive purposes, and domestic cattle do not require them. They are a nuisance and a danger to man and beast, especially in small yards, damaging and exciting one another. The milking yard should at all time be free of turmoil; it causes the cows to hold back their milk and give less. If the calf has been taken from the cow, do not strip the udder quite dry, especially if the weather be cold and raw, at least for the fourth or fifth day after calving. This will possibly prevent a chill, which often produces milk fever or garget, both untoward events that seldom occur where the calf has to do the natural work.

Drying off should not take place before a month or five weeks before calving. Try and not let it exceed that time. The simplest way of effecting it is not to quite clean milk the cow for a few days, and that only once a day, unless undue heat be shown in the udder, then perhaps twice a day may be reverted to, and hot fomentations of alum and water applied till the temperature becomes normal.

To bring cows in season, give as a drench a pint and a half of milk from a cow in season. This will answer for a mare equally as well.

The British Farmers' Association furnishes the following that is well worth bearing in mind, viz.:—Shorthorns gave 8,500lbs. of milk; Dutch, 8,000; Ayrshires, 7,500; Red Polled, 7,000; Jerseys and Guernseys, 6,000; Kerries and Dexter Kerries, 4,500, whilst the Victorian average is only 3,000. This was for eleven months.

A late *Dublin Gazette* gives an account of a dairy of sixty cows having been graded up from $3\frac{1}{2}$ to 5 butter fat, sixty per cent. having reached this splendid result in a comparative few years, and the rest of the herd to $4\frac{1}{2}$ and upwards, by selecting the calves from the best of the cows, and using a bull from a cow of a high percentage of butter fat coming from a family of noted milkers.

(To be continued).

GARDEN NOTES FOR MAY.

BY PERCY G. WICKEN.

The rain still holds off, but may be expected every day now, and most probably before this is printed we shall have had a good fall. Those districts which were favored by the good fall of rain early in March should now be showing the benefit of it. Gardeners in these districts who took advantage of the fall should have a good stock of young plants of various kinds ready to plant out during the next showery weather. All stable manure should be kept under a roof, so as to prevent the wet from washing all the substance out of it. Well-rotted stable manure cannot be excelled for garden work, and care should be taken to conserve all that is possible, but it should be well-rotted before using. The ground will still be warm, and the seeds sown now will germinate quickly, but as the ground becomes colder they will take longer and the growth will be slower, hence the advantage of early sowing. The application of lime occasionally will prove beneficial, especially after several applications of stable manure, as it will help to free the manurial ingredients in the soil, and render them more available for plant food. One of the most important points in growing vegetables is the question of rotation of crops. Never let roots follow roots, or peas follow peas. Make a change in the crop every season, and do not plant the same crop again in the same land for at least three years. By doing this you get the best results from the land, and also keep the insect pests in check, as when they find their food supplies gone, they will most likely perish, and the ground will become free from insect pests.

BROAD BEANS.—Sow as largely as possible, so as to keep up a supply. They need a good supply of moisture, and will grow in the cooler districts.

BRUSSEL SPROUTS.—Plant out any plants that may be strong enough, and put more seed in the seed boxes; put plants in rows 2 feet apart.

CABBAGE.—Put in what seed you require to keep up a supply, and try some different varieties to what you have growing. Plant out as many plants as possible, and always use fresh, vigorous young plants; those that have been in the seed bed for some time, and have become old and weedy, will never grow well when planted out. It is best to always have a bed of seed coming on, and to put out freshly grown plants.

CAULIFLOWER.—A few of this crop are now coming into market, and are fetching very high prices. This is generally a very profitable vegetable to grow, and there is always a good demand for them. Plant out any strong, healthy plants from the seed bed, and sow seed for future requirements.

CARROTS.—Sow a few rows to keep up a succession of supplies. Early Shorthorn and Intermediate are good varieties to sow this month.

LETTUCE.—Plant out any plants that are fit, and sow a supply of seed for future use.

ONIONS.—Sow largely of this plant, and if the previous sowings have been made in seed beds, they may be planted out. The drills should be 15 inches apart, and the plants 4 inches apart in the drills. The seed requires to be covered very lightly. It is best to plant out the onions on small ridges, which can easily be made with a hoe or Planet Junior machine, and as the roots grow the soil should be drawn away from the ridge, leaving the bulb exposed to the air.

PEAS.—Sow a good supply of this vegetable from time to time so as to keep up a supply. The main crop should be sown during the month. The tall-growing varieties will require to be staked.

TURNIPS.—A few rows may be sown to keep up a supply, but it is too late to obtain a good crop. The main crop should now be reaching a fair size and will require to be kept free from weeds, and any plants interfering with the growth of others must be removed.

RADISH.—A few rows may be sown. They require a good supply of well-rotted manure to force them along; to be of good flavor and tender they require to be quickly grown.

FARM.—Operations this month will be chiefly confined to ploughing and sowing the wheat crop. It should be sown as early as possible, the early sown crops generally do best. Wheat should be sown before the end of the month. Plough the land as deeply as it is possible to do, as the deeper the land is worked the better the crop will withstand the drought. Do not sow too great a quantity of seed to the acre as it is only money wasted. All experiments go to prove that three quarters to one bushel per acre drilled in gives by far the best results. Wheat sown at the rate of one bushel per acre gives 14 grains to each square foot of soil, a quantity which cannot mature, and they only prevent one another from stooling out and making a healthy growth. Other crops which can be sown this month are, Field Peas and Beans, Rape, Tares for fodder mixed with Oats, Barley or Rye, Lucerne, Clover, and grass seeds of all English varieties.

APPLE-TREE CANKER.—According to observations made by a French experimenter, the most efficacious remedies against this disease—which is caused by the fungus *Nectria ditissima*—were found to be nicotine, tannin and tannic acid.—*Nature*.

MARKET REPORT.

FOR MONTH ENDING MAY 9.

The W.A. General Produce Co. report sales effected for the following articles, on account of various consignees, for the month ending May 9:—
 Sales moderate. Bacon—Previous scarcity continues. Hams—Supplies almost nigh exhausted; small consignments expected per the s.s. Paroo. Butter—Values have firmed more than ever; now offering, f.o.b., Melbourne, 1s 3d to 1s 5d lb. Lard—Owing to scarcity of bacon, prices advanced fully 2d lb., f.o.b. Cheese—Moving off very well of late. Eggs—Local, fresh, selling readily. Potatoes—Imported still firming; local new selling well; many enquiries for seed. Onions—Reported material advance, f.o.b., Eastern States; locally, supplies limited. Chaff—Somewhat hardening in value, owing to farmers being unable to deliver just now. Bran and Pollard—Further rise reported, f.o.b. Flour—Expected to advance very shortly, owing to higher tendency of wheat. Oats—Feed selling freely, and, in particular, Algerian seed. Wheat—Firming all round. Oilcake is now more largely availed of as a substitute for bran and pollard for stock, poultry, etc. Fruit—Very little to offer throughout the week; high prices realised for what came to hand. Vegetables—Fairly plentiful, and, cabbages in particular, experienced a fall of more than 50 per cent. from previous week. Poultry—Plentiful, such as fowls, whereas ducks fit to kill are scarce. Game, if fresh, sells readily. Carcase pork, medium weights, cleanly butchered, sells well. Artificial manures in full swing.

Farm and Dairy Produce.—Bacon—Sides, 11½d to 1s lb. Hams—Hutton's, 1s 2½d to 1s 3d.; New Zealand, 1s 1d lb. Butter—Victorian, 1s 5d to 1s 7d; New Zealand, 1s 4d to 1s 5d lb.; Lard, 1lb and 2lb. tins, 9d; 4lb tins, 8½d lb. Cheese—Loaf, coarse lots, 8½d to 9d lb.; medium, 8d to 8½d lb. Eggs—Local, fresh, 2s 6d to 2s 9d doz. Potatoes—Imported, £7 10s to £8 ton; local new, £10 to £11 ton. Onions—Worth 11s to 12s cwt. Chaff—£4 10s to £5 10s ton. Bran—£6 15s to £7 5s ton. Pollard—£7 to £7 10s ton. Flour—Sacks, £9 10s; quarter, £9 15s ton. Oats—New Zealand, 3s 3d; Algerian seed, 3s 6d to 4s bushel. Maize—Worth 6s 6d bushel. Wheat—4s 6d; seed, 4s 9d to 5s bushel. Oilcake—From £6 15s to £7 ton. Peas (Dry)—Big lots, 7s 6d cwt.

Fruit.—Oranges—Local, few sold 10s to 13s case. Lemons—In demand; Lisbon—16s to 18s case. Bananas—Worth from 20s to 25s case. Grapes sold from 3s to 10s per case. Apples sold for 20s to 22s 6d, 25s to 30s case. Pears—Sold for 20s to 30s case. Quinces—Worth 5s 8d to 6s 6d case.

Vegetables.—Cabbage—4s to 5s cwt. Carrots and Parsnips—1s 6d to 1s 9d dozen bunches. Swede Turnips—Worth £6 10s to £7 10s ton. French Beans—1½d to 2d lb. Marrows and Pumpkins—4s 6d to 5s 6d cwt. Capsicums and Chillies—6d a lb. Salads and Herbs—Lettuce worth 8d a doz. Spring Onions—Worth 9d dozen bunches. Beetroot—Worth 2s dozen bunches. Tomatoes—Worth 1d to 2d lb. Celery—Worth 1s 6d to 2s 6d a dozen bunches. Cress—Worth 6d dozen bunches. Thyme, Marjorum, and Sage—Off stalk, 9d lb. Mint—Off stalk, 6d lb.

Poultry.—Fowls—Best table, 5s to 5s 6d pair; others, from 3s 6d to 4s pair. Ducks—6s 6d to 7s 6d pair. Geese—Worth 12s a pair. Turkeys—Gobblers, 15s to 20s; Hens, 10s 6d to 14s pair.

Game.—Black Duck—Worth 4s 6d pair. Teale—Worth 3s 6d pair. Mountain Duck—4s 6d to 5s pair. Kangaroo Meat—Worth 3d to 4d lb.

Carcase Meat.—Pork—50lb. to 70lb., 6d to 6½d lb.; 100lb. and over, 4d to 4½d. Lamb—Many enquiries. Veal—Many enquiries.

Sundries.—Bonedust—£6 15s to £7 10s ton. Phosphate—£4 10s ton. Super-phosphate—£6 10s ton. Coarse Bacon Salt—£3 10s ton. New Corn Sacks—7s 6d doz.; second-hand, 4s 6d. New Bran Bags—4s 9d doz.; second-hand, 3s 6d.

THE CLIMATE OF WESTERN AUSTRALIA DURING APRIL, 1901.

It was the general opinion, in face of the decided cool change and rain that set in during the last week of March, that we had seen the last of the summer, but throughout the greater part of April the days and nights were unusually close and sultry. The mean temperature at the Gardens was 1·8 degrees above the average, this being the hottest April since 1890.

On referring to the climate maps for the State it will be seen that the barometric pressure throughout was normal. The temperature in the N.W. and tropics was about an average, but the mean daily temperature at Marble Bar (97·6 degrees) is worthy of note, and quite bears out the general report that this is one of the hottest places in the N.W. A station of secondary importance, viz., one equipped with thermometers only, was established there in February this year. In the S.W., and throughout the Murchison and Coolgardie Goldfields, an increase over the average was noticeable both in the mean day and night temperatures. Along the south coast, however, this increase was not felt.

A night temperature of under 30 degrees was experienced at Bridgetown and Collie, and all inland stations between Southern Cross and Katanning registered under 40 degrees. The following table shows the mean temperature and lowest on the surface of the ground during the month.

	Mean.	Lowest.
Cue	57·4	43·1
Coolgardie	51·5	36·2
Southern Cross	50·2	31·8
York	51·0	33·4
Perth Observatory	54·1	35·2
Katanning	43·8	27·5
*Bridgetown	43·9	—
Karridale	48·5	33·2

* From the 7th of the month only.

The rainfall was below the average throughout the State. No rain was recorded over the tropics, N.W., and Coolgardie Goldfields, and a few points only over the Murchison. In the S.W. and S. it was considerably below the average, except in extreme S.W. and S. coastal districts where only a slight decrease was noticeable.

THE CLIMATE OF WESTERN AUSTRALIA DURING APRIL, 1901.

Locality.	Barometer (corrected and reduced to sea level).				Shade Temperature.				Average for Previous Years.				Rainfall.		
					April 1901.										
	Mean of 9 a.m. and 3 p.m.	Average for previous years.	High-est.	Low-est.	Mean Max.	Mean Min.	Mean of Month.	Highest Max.	Lowest Max.	Mean Max.	Mean Min.	Highest ever re- corded.	Lowest ever re- corded.	Points (100 to inch) in month. Jan. 1.	Total points since Jan. 1.
Wyndham	29.912	29.892	30.114	29.822	96.2	76.3	86.2	101.5	63.5	98.1	76.8	113.0	65.0	Nil	1371
Derby	—	.909	.115	.741	98.7	70.8	84.8	103.2	55.8	95.6	71.5	106.0	49.0	Nil	1028
Broome	.920	.906	.118	.745	95.3	69.7	82.5	100.5	56.0	93.1	70.4	102.4	55.0	Nil	2192
Condon	.934	.951	.128	.858	—	62.0	—	—	46.0	91.3	65.4	103.0	57.0	Nil	2056
Cossack	.974	.936	.165	.830	94.0	71.1	82.6	101.4	61.8	90.2	72.2	105.0	61.0	Nil	657
Onslow	.948	.978	.113	.785	95.2	69.1	82.2	102.2	62.5	93.0	65.9	106.0	45.0	Nil	128
Carnarvon	30.003	.972	.160	.911	82.2	66.3	74.2	90.8	57.3	86.7	62.8	108.0	46.0	Nil	152
Hamelin Pool	29.989	30.030	.226	.837	87.5	62.3	74.9	97.4	53.2	89.2	62.6	105.6	50.0	Nil	16
Geraldton	30.026	.078	.309	.885	80.1	61.1	70.6	99.4	47.1	78.6	58.8	100.0	42.0	10	90
Hall's Creek	.000	—	.263	.783	90.5	61.7	76.1	97.2	53.0	—	—	—	—	Nil	1465
Marble Bar	—	—	—	—	97.6	65.8	81.7	102.0	50.0	—	—	—	—	Nil	1202
Nullagine	29.967	—	.171	.763	93.2	58.0	75.6	99.8	41.0	—	—	—	—	Nil	1531
Peak Hill	.970	—	.250	.719	89.5	64.3	76.9	95.8	53.0	—	—	—	—	18	449
Cue	.986	30.045	.227	.742	89.4	62.1	75.8	97.2	45.2	85.2	60.0	101.0	41.0	10	291
Yalgoo	—	.056	.333	.772	88.7	60.7	74.7	98.0	46.1	83.9	58.4	102.5	42.3	25	147
Lawlers	30.048	—	.391	.779	85.8	61.3	73.6	94.3	44.0	—	—	—	—	Nil	473
Laverton	.106	—	.426	.805	83.0	64.0	73.5	96.2	43.0	—	—	—	—	Nil	419
Manzies	.072	.090	.403	.795	82.2	57.0	69.6	93.6	42.6	79.9	55.3	98.0	37.0	Nil	383
Kalgoorlie	.105	.100	.414	.867	80.6	56.7	68.6	91.8	40.2	78.1	54.2	95.4	38.8	Nil	282
Coolgardie	.088	—	.426	.824	80.9	55.3	68.1	92.8	40.0	78.3	53.1	96.1	39.1	2	262

The figures for previous years have been given whenever there are at least three years' complete records. This number is a very low one upon which to base averages, but otherwise the Goldfields would be excluded.

THE CLIMATE OF WESTERN AUSTRALIA DURING APRIL, 1901.—Continued.

Locality.	Barometer (corrected and reduced to sea level.)				Shade Temperature.						Average for Previous Years.				Rainfall.	
	April 1901.				Average for Previous Years.				Rainfall.		Average for Previous Years.		Rainfall.			
	Mean of 9 a.m. and 3 p.m.	Average for previous years.	High-est.	Low-est.	Mean Max.	Mean Min.	Mean of Month.	Highest Max.	Lowest Max.	Mean Max.	Mean Min.	Highest ever re-versed.	Lowest ever re-versed.	Points (100 to inch) in Jan. I.	Total points since Jan. I.	
Southern Cross	... '100	'089	'426	'842	80.0	54.2	67.1	94.1	36.1	79.2	50.2	98.0	31.7	10	94	
York	... '086	'104	'426	'910	80.4	53.9	67.2	97.0	36.5	76.1	52.2	100.2	35.0	16	158	
Guildford	... '071	'114	'427	'907	80.8	56.5	68.6	95.8	38.2	—	—	—	—	28	232	
Perth Gardens	... '080	'117	'431	'914	78.0	57.9	68.0	93.2	42.6	77.7	54.7	106.5	41.0	48	209	
Perth Observatory	... '064	'094	'413	'914	77.7	58.7	68.2	94.9	42.9	75.0	50.2	97.4	43.2	45	218	
Fremantle	... '060	'043	'397	'894	76.3	60.5	68.4	93.6	46.4	73.6	57.5	93.0	43.0	33	213	
Rottnest	... '060	'043	'397	'894	73.8	62.3	68.0	91.0	49.4	75.1	58.3	92.5	47.8	17	140	
Mandurah	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Wandering	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Collie	...	...	...	...	74.3	45.2	59.8	89.1	29.6	...	...	...	...	31	177
Dardenup	...	...	...	...	...	...	...	...	...	...	...	...	...	104	228
Bunbury	... '096	'113	'450	'871	76.8	53.5	65.2	89.2	37.3	71.6	53.0	91.0	38.0	129	342	
Busselton	...	...	...	...	73.0	51.8	62.4	87.3	35.2	...	...	...	...	103	386
Bridgetown	...	...	...	...	74.0	44.7	59.4	90.0	29.5	...	...	...	...	137	430
Karridale	... '084	'113	'403	'787	71.1	53.7	62.4	83.5	38.0	71.4	51.5	92.0	36.8	21.7	496	
Cape Leeuwin	... '072	'076	'390	'723	69.6	59.6	64.6	77.8	50.6	69.2	58.7	89.5	49.0	202	390	
Katanning	... '091	'098	'326	'910	73.7	49.6	61.6	91.2	55.0	73.5	47.5	96.2	33.0	36	260	
Albany	... '123	'126	'435	'801	70.2	52.6	61.4	81.6	39.5	67.4	53.9	98.8	39.0	154	437	
Breaksea	... '110	'110	'416	'803	67.3	57.1	62.2	77.5	45.2	66.7	55.9	96.4	44.0	132	302	
Esperance	... '118	'144	'405	'923	73.8	53.6	63.7	84.6	43.0	73.3	53.3	99.0	40.2	32	311	
Eyre	... '146	...	'339	'888	73.7	52.2	63.0	90.2	38.5	...	...	...	...	50	265

The figures for previous years have been given whenever there are at least three years' complete records. This number is a very low one upon which to base averages, but otherwise the Goldfields would be excluded.

THE OBSERVATORY, PERTH, 8th May, 1901.

W. E. COOKE. Government Astronomer.

**RAINFALL for March, 1901 (completed as far as possible),
and for April, 1901 (principally from Telegraphic Reports).**

STATIONS.	MAR.		APRIL		STATIONS.	MAR.		APRIL	
	No. of points. 100 equals 1in.	No. of wet days.	No. of points. 100 equals 1in.	No. of wet days.		No. of points. 100 equals 1in.	No. of wet days.	No. of points. 100 equals 1in.	No. of wet days.
EAST KIMBERLEY:					N'TH-WEST—Cont.				
Wyndham ..	412	13	Nil	..	Tambrey ..	..	..	..	..
6-Mile ..	455	10	..	..	Millstream ..	..	..	..	..
Carlton ..	..	..	..	..	Mallina ..	402	5	..	..
Denham ..	..	..	..	..	Whim Creek ..	324	6	Nil	..
Rosewood Downs ..	..	..	..	..	Cooyapooya ..	357	8	..	..
Argyle Downs ..	..	..	..	..	Woodbroke ..	556	8	..	..
Lisadell ..	..	..	..	..	Croydon ..	473	9	..	..
Turkey Creek ..	575	14	Nil	..	Balla Balla ..	368	7	Nil	..
Ord River ..	458	..	..	..	Roebourne ..	295	6	Nil	..
Koojubrin ..	..	..	..	..	Cossack ..	234	5	Nil	..
Hall's Creek ..	455	..	Nil	..	Fortescue ..	121	4	Nil	..
Flora Valley ..	..	..	..	..	Mardie ..	102	6	..	..
Ruby Creek ..	..	..	..	..	Mt. Stewart ..	858	7	..	..
Denison Downs ..	175	11	..	..	Yarraloola ..	..	..	..	..
WEST KIMBERLEY:					Chinginarra ..	465	5	..	..
Obagama ..	329	6	..	..	Peedamullah ..	716	9	..	..
Derby ..	193	4	Nil	..	Onslow ..	55	2	Nil	..
Yeeda ..	..	..	..	..	Red Hill ..	623	8	..	..
Liveringa ..	378	5	..	..	Mt. Mortimer ..	465	6	..	..
Mt. Anderson ..	196	7	..	..	Wogoola ..	187	8	..	..
Leopold Downs ..	503	9	..	..	Nanutarra ..	488	9	..	..
Fitzroy Crossing ..	216	8	Nil	..	Point Cloates ..	286	2	Nil	..
Quانبun ..	..	..	..	..	GASCOYNE:				
Nookanbah ..	..	..	..	..	Winning Pool ..	305	6	Nil	..
Broome ..	349	7	Nil	..	Towara ..	245	6	..	..
Thangoq ..	..	..	..	..	Ullawarra ..	348	8	..	..
La Grange Bay ..	251	8	1	1	Woorkadjia ..	326	8	..	..
NORTH-WEST:					Bangemall ..	280	5	..	..
Wallal ..	595	9	Nil	..	Minnie Creek ..	213	3	..	..
Condon ..	942	7	Nil	..	Yanyearddy ..	468	4	..	..
DeGrey River ..	886	8	..	..	Carnarvon ..	152	1	Nil	..
Port Hedland ..	648	6	Nil	..	Dirk Hartog Is ..	19	1	..	..
Boodarie ..	338	5	..	..	Mungarra ..	192	5	..	..
Yule River ..	..	..	..	..	Clifton Downs ..	262	6	..	..
Warralong ..	523	8	..	..	Dairy Creek ..	81	5	..	..
Muccan ..	458	10	..	..	Tamala ..	7	2	..	..
Mulgie ..	643	8	..	..	Sharks Bay ..	30	1	Nil	..
Eel Creek ..	..	..	..	..	Kararang ..	13	1	..	..
Coongon ..	420	6	..	..	Meedo ..	31	3	..	..
Warrawagine ..	642	7	..	..	Wooramel ..	31	2	Nil	..
Bamboo Creek ..	362	6	Nil	..	Hamelin Pool ..	16	2	Nil	..
Marble Bar ..	413	9	Nil	..	Byro ..	64	5	..	..
Warrawoona ..	635	9	Nil	..	Peak Hill ..	95	4	18	..
Corunna Downs ..	319	8	..	..	Horseshoe ..	Nil	..	1	1
Nullagine ..	663	..	..	..	Abbotts ..	184	5	22	2
Tambourah ..	387	10	Nil	..	Belele ..	70	3	..	..
Roy Hill ..	244	7	..	..	Mileura ..	12	1	..	..
Woodstock ..	919	9	..	..	Bernier Island ..	4	1	..	..
Mt. Florence ..	425	5	..	..	Manfred ..	63	5	..	..
					Meelya ..	89	4	..	..

RAINFALL.—Continued.

STATIONS.	MAR.		APRIL.		STATIONS.	MAR.		APRIL.	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
GASCOYNE—Cont.					S.W. Div.—Cont.				
Woogarang ..	44	2	56	3	Guildford ..	195	7	28	4
Billabolong ..	114	3	..	..	Kallyamba ..	149	5	..	..
Wooleane ..	10	2	..	..	Can'ing W'works	200	6	50	3
Murgoo ..	..	..	Nil	..	Perth Gardens ..	149	7	48	5
Meka ..	152	7	..	..	„ Observatory	159	7	45	5
Mt. Wittenoom ..	73	4	..	..	Subiaco ..	157	6	39	5
Nannine ..	118	3	Nil	..	„ Claremont	132	5	32	4
Star of the East	197	3	Nil	..	„ Richardson	157	3	36	4
Tuckanarra ..	228	6	10	1	Armadale ..	150	5	40	4
Coodardy ..	93	4	..	..	Fremantle ..	173	7	33	8
Cue ..	129	5	10	1	Rottneft ..	115	7	17	3
Day Dawn ..	166	4	4	..	Rockingham ..	179	4	38	4
Lake Austin ..	256	4	15	2	Canning River ..	132	5	202	7
Lennonville ..	246	4	8	1	Jarrahdale ..	206	4	30	2
Mt. Magnet ..	172	4	17	1	Mandurah ..	125	3	37	4
Challa ..	69	2	31	1	Pinjarrah ..	157	4	69	3
Youeragabbie ..	42	2	..	..	Harvey ..	170	4	29	5
Murrum ..	..	..	38	2	SOUTH-WEST, CENTRAL PART (INLAND):				
Yalgoo ..	115	3	25	..	Momberkine ..	112	3	Nil	..
Gabyon ..	154	2	..	..	Culham ..	79	5	14	4
Gullewa ..	122	4	Nil	..	Newcastle ..	51	4	8	3
SOUTH-WEST DIVISION (N'N PART):					Eumalga ..	73	5	17	4
Mur. House ..	12	2	..	..	Northam ..	99	5	8	5
Mt. View ..	86	6	2	1	Grass Valley ..	96	4	12	3
Yuin ..	105	3	..	..	Meckering ..	155	4	..	..
Northampton ..	100	6	Nil	..	Doongin ..	91	5	7	2
Mt. Erin ..	154	5	4	1	Whitehaven ..	129	4	100	5
Tibbradden ..	150	5	2	2	Sunset Hill ..	86	5	13	3
Sand Springs ..	..	..	Nil	..	Cobham ..	141	6	19	3
Mullewa ..	99	4	..	..	York ..	133	6	17	4
Bootenal ..	126	5	6	1	Beverley ..	132	3	14	3
Geraldton ..	62	7	10	2	Barrington ..	105	3	..	..
Greenough ..	125	6	10	2	Sunning Hill ..	74	2	22	2
Dongara ..	25	5	1	1	Wandering ..	132	4	31	6
Dongara (Pearse)	27	3	1	1	Pingelly ..	87	3	32	5
Strawberry ..	226	5	Nil	..	Marradong ..	162	4	24	4
Minginew ..	302	7	Nil	..	Bannister ..	151	4	12	5
Field's Find ..	46	3	16	1	Narrogin ..	106	4	16	4
Carnamah ..	215	3	3	1	Wickepin ..	107	3	12	3
Watheroo ..	88	5	5	3	SOUTH-WEST DIVISION (S'N PART):				
Dandaragan ..	130	6	32	5	Bunbury ..	249	5	103	4
Moora ..	109	5	19	4	Collie ..	113	5	104	6
Yatheroo ..	163	5	32	4	Salvation Army	..	..	..	..
Walebing ..	141	6	27	4	Settlement ..	116	4	102	4
New Norcia ..	102	7	27	4	Glen Mervyn ..	144	3	95	3
SOUTH-WEST DIVISION, CENTRAL (COASTAL):					Dardanup ..	177	6	129	5
Gingin ..	183	5	15	4	Donnybrook ..	197	4	176	4
Mundaring ..	212	7	39	4	Boyanup ..	85	5	177	7
Belvoir ..	175	4	34	3					

RAINFALL.—Continued.

STATIONS.	MAR.		APRIL		STATIONS.	MAR.		APRIL	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
SOUTH-WEST—Cont.					EASTERN DIV.—Cont.				
Busselton ..	277	7	137	10	Mt. Morgan ..	14	1	Nil	..
Quindalup ..	155	7	145	7	Laverton ..	15	1	Nil	..
Margaret River ..	258	8	187	5	Murrin Murrin ..	12	4	3	1
Lower Blackwood ..	244	8	..	..	The Granites ..	Nil	..	Nil	..
Karridale ..	218	10	217	12	Tampa ..	41	2	..	..
Augusta ..	188	11	202	8	Niagara ..	23	2	Nil	..
Cape Leeuwin ..	139	12	202	14	Yerilla ..	29	2	Nil	..
Riddellia ..	214	5	..	..	Menzies ..	5	1	Nil	..
The Warren ..	221	7	..	..	Mulline ..	13	1	Nil	..
Lake Muir ..	186	6	151	10	Goongarrie ..	Nil	..	Nil	..
Mordalup ..	179	9	102	9	Kurawa ..	4	2	Nil	..
Deeside ..	164	5	176	6	Dixie Gold Mine ..	3	1	Nil	..
Riverside ..	188	8	..	..	Kurnalpi ..	Nil	..	Nil	..
Balbarup ..	237	8	315	10	Bulong ..	1	1	Nil	..
Wilgerup ..	172	7	174	8	Kanowna ..	2	1	Nil	..
Mandalup ..	136	4	..	..	Kalgoorlie ..	2	1	Nil	..
Bridgetown ..	144	6	137	9	Coolgardie ..	4	2	2	1
Greenbushes ..	166	4	286	5	Burbanks ..	3	1	2	1
Williams ..	170	4	30	8	Londonderry ..	7	1	..	..
Arthur ..	101	4	38	5	Woolubar ..	16	1	Nil	..
Darkan ..	85	3	49	4	Widgiemooltha ..	4	1	1	1
Wagin ..	144	4	18	3	50-Mile Tank ..	10	1	4	1
Glencove ..	125	4	15	4	Norseman ..	30	1	4	2
Dyiliabing ..	131	5	24	3	Bulla Bulling ..	Nil	..	Nil	..
Katanning ..	137	5	36	6	Woolgangie ..	24	2	..	..
Kojonup ..	96	4	41	2	Boorabbin ..	30	3	9	4
Broomehill ..	128	3	58	6	Karalee ..	55	2	..	..
Sunnyside ..	120	3	57	4	Yellowdine ..	..	..	..	..
Woodyarrup ..	116	4	131	10	Southern Cross ..	45	3	10	3
Cranbrook ..	138	5	81	8	Mount Jackson ..	24	2	..	..
Blackwattle ..	123	5	..	..	Burracoppin ..	..	..	38	2
Mt. Barker ..	192	7	133	9	Kellerberrin ..	81	4	18	2
Kendenup ..	177	8	83	9	Mangowine ..	76	5	..	..
St. Werburgh's... ..	204	8	145	11	Waltoning ..	67	4	..	..
Forest Hill ..	180	8	190	10	EUCLA DIVISION :				
Denmark ..	..	..	165	..	Ravensthorpe ..	..	..	70	6
Albany ..	188	9	154	10	Cocoharup ..	101	4	..	..
Point King ..	180	8	160	8	Hopetoun ..	102	6	49	8
Breaksea ..	128	9	132	12	Fanny's Cove ..	87	4	..	..
Cape Riche ..	145	4	..	..	Park Farm ..	70	4	..	..
Pallinup ..	115	4	118	5	Esperance ..	86	5	32	..
Bremer Bay ..	98	5	49	8	Gibson's Soak ..	97	5	..	..
Jarramongup ..	137	7	117	11	30-Mile Condenser ..	73	2	..	..
EASTERN DIVISION :					Swan Lagoon ..	39	5	..	..
Lake Way ..	87	5	Nil	..	Lynburn ..	52	..	..	..
Mt. Sir Samuel ..	7	1	Nil	..	Grass Patch ..	39	5	120	5
Lawlers ..	27	4	Nil	..	Israelite Bay ..	24	3	47	5
Diorite King ..	87	3	Nil	..	Frazer Range ..	Nil	..	..	..
Sturt Meadows ..	Nil	..	..	..	Balladonia ..	Nil	..	32	1
Mt. Leonora ..	11	1	Nil	..	Eyre ..	36	..	50	..
Mt. Malcolm ..	1	1	Nil	..	Eucla ..	41	3	102	3

The Observatory, Perth, May, 10, 1901.

W. E. COCKE, Govt. Astronomer.

RETURN OF FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING APRIL, 1901.

NAME OF PORT	No. of Ships.	No. of Consign- ments Inspected.	Total No. of Cases.	No. of Cases Passed.	No of Cases Prohibited.	No. of Cases Destroyed.	No. of Cases in Quarantine.	No. of Cases Dipped.	No. of Cases of																
									Apricots.	Bananas.	Cherries.	Gooseberries.	Grapes.	Lemons.	Nectarines.	Oranges.	Passion Fruit.	Peaches.	Plums.	Rhubarb.	Strawberries.	Pomoloes.	Pines.	All other fruits.	
FREMANTLE	7	9	2033	2033	..	..	..	2033	..	80	..	..	..	142	..	1072	..	..	739	..	..	..	..	..	..
ALBANY .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
GERALDTON .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMBLETON .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSETTON .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE .. ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL	7	9	2033	2033	..	..	..	2033	..	80	..	..	..	142	..	1072	..	..	739	..	..	..	..	..	..

DEPARTMENT OF AGRICULTURE,
7th May, 1901.

RETURN OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING

APRIL, 1901.

NAME OF PORT.	No. of Ships.	No. of Consign- ments of Trees or Plants.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments Passed.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments of Trees or Plants Prohibited.	Total No. of Trees or Plants in such Consignments.	No. of Packages Dipped.	No. of Trees.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
									Ornamental & Pot Plants.	Almonds.	Apples.	Apricots.	Cherries.	Figs.	Lemons.	Limes.	Mulberries.	Oranges.	Peaches.	Pears.	Plums.	Small Fruits.	Vine Cuttings.	All Other Trees																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
TOTAL ..	5	7	2825	7	2825	..	2825	22	2825	500

DEPARTMENT OF AGRICULTURE,
7th May, 1901.

NOTES.

JERSEY BULL.—A correspondent informs us that he has a very well-bred Jersey Bull for sale cheap, imported from Victoria, four years old, and very quiet.

CORRECTIONS.—In last month's issue in describing the various parts of a fowl, number 12 on the illustration is described as "wire tail feathers." It should read "true tail feathers." On page 296 the word "stay"—another name for a young cock—should be "stag."

MANURING BANANAS.—Mr. R. H. Elworthy, of Priestman's River, took 5 acres of his coast lands in Portland, red soil which, he states, does not grow bananas; he manured one acre with sheep manure, and on this acre the bananas made luxuriant growth, and came in earliest, but bore small branches of seven and eight hands. On one acre rotten cocoanut husks were dug in, and here the fruit came slow, with less stem and head growth than the acre with sheep manure, but the bunches were larger and fairly good on the whole. On the remaining three acres no manure was applied, and the bananas grew very poorly, producing, when they produced fruit at all, small bunches and poor fruit.

FOOT AND MOUTH DISEASE.—At a recent meeting of the Academy of Medicine, Dr. Jarre announced the discovery of a remedy for the foot and mouth disease, which is so fatal to sheep. He says he has successfully used the remedy in 1,500 cases in two years. It consists of a concentrated solution of chromic acid at 33 per cent. chemically pure. This is employed as a caustic to the sore. The cure is rapid and certain. Dr. Jarre says that M. Dupuy, Minister of Agriculture, has promised to give the remedy official tests.—*Scientific American*.

The above was submitted to Mr. P. Wicken, of the Western Australian Department of Agriculture, who stated:—"Foot and mouth disease is a specific eruptive disease, affecting especially the mucus membrane of the mouth and the skin around the coronet, and between the digits. It is both contagious and infectious. It affects sheep, pigs, poultry, dogs, horses, and human beings. It is therefore necessary that all infected carcasses should be burned. It is prevalent both in Europe and America, but up to the present time not in these States. Chromic acid is a powerful caustic and antiseptic, used to remove warty excrescences, and applied to indolent ulcers, putrid sores and cancers. It would require great care in application, as at the strength above mentioned it would be very caustic. Chromic acid is not to be obtained in this State, but the price quoted in the English price lists is 4s. per lb. chemically pure. It can be obtained in the Eastern States."

HARD JAM.—Old friends occasionally crop up under new names, to-day the "Apple-butter" of our boyhood, with a little more evaporation, is sent over the world from America as "Hard Jam." By whatsoever name it be called, this hard fruit pulp will be welcomed by thousands, where there is no cool storage accommodation, and objection is made to the substitution of dried fruit, suffering, as that often does, under parasitic attacks, or the "curing" process of sulphurating. Our friends in Canada know how to make the old commodity, so do a good many farmers in the United States; and now the process is being taken up in California, we may expect to find "hard jam" pushing its way all over the fruit-loving world. This jam is not limited to apples or pears. Gauva and quince and pine apple jam of the sort is largely consumed in New Orleans, sent thither from South America. Of course, it is understood that the pulp is subjected to the process of evaporation, and when sufficiently solid and cooled is cut up into bricks of any required size, which are done up in oiled or otherwise prepared tissue, packed in cases and shipped. No glass, metal, or earthenware receptacles are found necessary now, and consumers will be able to buy a brick of any sort of hard jam, just as they would a roll of Dorset or any other butter.

IMPROVING BREED OF HORSES.—A scheme for the improvement of the breed of horses in Victoria will be discussed at the next meeting of the Royal Agricultural Society of Victoria. The scheme provides for—(1) Premiums for stallions; (2) registrations of stallions; (3) selection of stallions; and (4) registration of mares. It is recommended that the sum of £1,000 be granted annually for premiums for stallions. That the State be divided into 10 districts, and that a draught and a thoroughbred stallion in each district be allotted a £50 premium each, and that each agricultural society in a district be asked to give a minimum of £25 additional premium to each horse allotted to the district. In the registration of stallions it is recommended that the Government appoint a committee for each district to pass stallions for registration, persons eligible for such committee to be nominated by the societies. The registration fee to be £1 1s. The selection of stallions to be made at a parade to be held at some central place to be fixed on by the 10 districts, and the society offering the highest premium to have the first pick of the sires, and so on in the order of the premiums offered. Registered stallions to be limited to 75 mares in one season, the service fee to be £4 4s. for each mare. The mares to be served by premium stallions are to be passed by the same committee that pass the stallions, and for which a registration fee of 10s. (every third year) shall be paid. That a penalty of £20 be enacted for any registered stallion serving an unregistered mare, and that a penalty of £10 be enacted for any registered mare being served by an unregistered stallion.

QUANTITY OF WHEAT PER ACRE.—Professor Lowrie, of Roseworthy College, South Australia, writes:—"The quantity of wheat it is advisable to sow per acre, varies so much with climate and conditions that I do not think any precise statement is possible. The quantity depends on (a) the character of the wheat, whether large or small berried; (b) the habit of growth or tillering habit; (c) the character of the soil; (d) the freedom from weeds of the farm and (e) climate. I cannot agree with those who practice extremely thin seeding. My own practice on this farm is to sow from $\frac{3}{4}$ of a bushel up to 65lb per acre. If intended for hay, I sow $1\frac{1}{4}$ bushels per acre. The thinnest seeding could be practised on new land with somewhat light rainfall. If oats I generally sow from 2 to $2\frac{1}{2}$ bushels per acre, and of barley $1\frac{1}{4}$ to $1\frac{1}{2}$ bushels per acre.

ANGORA GOATS.—The Angora goat was introduced into the United States in the year 1849 by Dr. Davis, who was presented by the Sultan of Turkey with two rams and seven ewes as a complimentary present. It was many years before Angora goat breeding for mohair was taken up as an industry, but once the possibilities of the business were realised, the goats were imported in large numbers, and were bred pure, and crossed with common goats, which, it may be remarked, are not commonly kept in America. The latest estimate puts the number at 400,000, of which Texas carries a larger number than any other State. The goats are very remunerative stock; the value of the fleece, which weighs from 3lb. to 5lb., varies according to quality, the quality varying with the purity of the breed. Half-breds scarcely pay for shearing, while the fleece of the nearly pure goat ranges in value from 1s. 3d. to 1s. 8d. per lb. America exports about one million pounds weight of mohair annually, England being her best market.

TO REMOVE WARTS ON CATTLE.—The most expeditious and certain way of ridding cattle of warts is to have them removed either with a hot iron, ecraseur, or a knife. When either of the two latter is used, it is generally advisable to apply some astringent or caustic, such as powdered sulphate of copper, sulphuric acid, or pure carbolic acid to the "roots" of the warts, especially if they are in such a position as to prevent them being thoroughly excised. It is nearly always best to excise them in the first instance, and it certainly is so when they attain such dimensions, and are present in such numbers as to "hang in clusters." The cause of the growth of warts on an animal is a more difficult matter to explain, but recent research appears to prove that in the first place micro-organisms are at the bottom of the mischief, and these, by the irritation their presence causes, produce thickening of the epidermis, which goes on increasing until a wart or "anbury" is formed. Doubtless some animals are more prone to be attacked by warty growths than others, and certain localities also are more favorable to their development than others.

CULTIVATION OF LUCERNE.

BY PERCY G. WICKEN.

It is surprising, considering the value of this plant as a fodder, and the heavy yields to be obtained from it, that it is not more cultivated. It is a crop that should be grown by every farmer who has stock to feed, or who is in a position to send hay to market. In a recent trip along the South-West line, almost the only green spots to be seen were small patches of lucerne a few yards square. This of itself should give sufficient encouragement to farmers to plant out a small crop, and try for themselves the results of the experiment. Once established it is a crop that will last for years,



ALFALFA, OR LUCERNE.

a, Spiral Seed Pod. b, End view of same. c, Seed.

and requires very little attention. It has not to be sown every year like a cereal crop, and in a favorable season can be cut for green feed or hay every six weeks or so. Lucerne can either be fed down, cut for green feed, made into hay or ensilage, and is valuable feed whichever way it is used.

HISTORY.

Lucerne (*Medicago Sativa*), or, as the Americans call it,

Alfalfa, is a native of Western Asia, and has now spread through the Middle and Southern Europe, and Middle Asia. The Romans brought it 470 years before the Christian era from Media, hence the generic name. It is a perennial fodder herb of great importance, and largely grown in all countries with a temperate climate. It keeps green and fresh in the hottest season of the year, even in

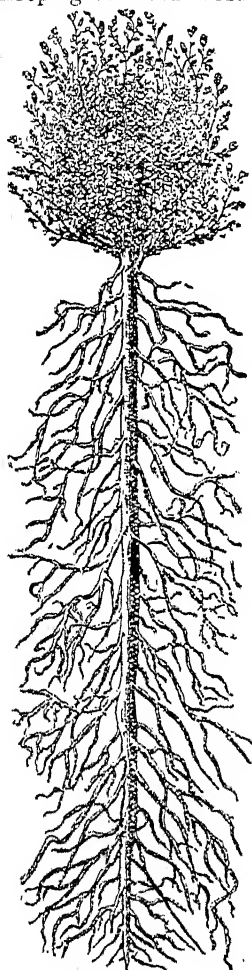


ILLUSTRATION SHOWING THE
PENETRATING POWER OF
LUCERNE ROOTS.

dry districts, and grows, when cultivated, with great vigor on river banks where the soil is deep. It responds well to irrigation. Its deep penetrating roots enable it to stand lengthy periods of drought and roots have been found at a depth of 66ft. from the surface. Lucerne is at its best from the second to the sixth year.

SOIL.

Lucerne prefers a deep well-drained calcareous loam where it can send its roots deep into the subsoil and thereby enable it to withstand extended periods of drought. It does remarkably well on river banks and in situations where the roots are able to reach a supply of water, the roots soon find out where the water is and go down until they reach a supply. Lucerne does well on land that has a friable loam as surface soil and a retentive clay subsoil which will hold the moisture during the summer months and the roots are able to penetrate into the subsoil. Some wonderful results have been obtained from lucerne by irrigation. In the U.S.A. immense areas of lucerne are grown under irrigation, and it is the mainstay of the American farmer, as many as 35,000 acres being grown in one district. While the Woodland Canal in California waters 13,000 acres of lucerne alone. Such instances can be multiplied indefinitely.

Americans claim that by irrigating lucerne, two head of cattle can be carried on land that without irrigation will not carry one to 20 acres.

In Victoria the irrigation of lucerne is largely carried out. It has also been grown by means of irrigation at Pera Bore, one of the hottest and driest parts of N.S.W.

Lucerne will not succeed in a shallow soil, however rich or well prepared it may be, if the field is underlaid by an impermeable

subsoil or by rock or hard-pan. Neither will the crop stand flooding with stagnant water.

PREPARATION OF THE SOIL.

Much depends on this. The land requires to be well cultivated. It is not advisable to sow lucerne on new land. It will do much better on land which has been cropped two or three times with clearing crops, so that all the couch and other weeds have been removed from the ground. The lucerne has to remain in the ground for a long time, and requires to have complete possession of the soil. If it is choked out by weeds at the commencement of its growth, it has no chance to recover itself before the hot weather comes on and then the weeds obtain possession of the soil. Once established the lucerne will be able to hold its own against the weeds owing to the depth the roots reach down. If the subsoil is clayey, subsoiling will be necessary to a depth of eighteen inches. This is best performed by two ploughs following one another, the mould board of the second plough being removed. The first plough turns over a furrow to a depth of nine inches, the second plough follows the first, and breaks up the furrow to a further depth of nine inches, or more if possible. The subsoil is not brought to the surface, but is simply broken up and the next furrow turned on top of it. This enables the roots to penetrate deeply into the soil. Where the sub-soil is loose and open this may not be required. At any rate, the land requires to be ploughed, cross ploughed, well harrowed and brought to a fine tilth by means of scarifiers, disc harrows, etc., according to the nature of the soil. The seed being very small, it requires a fine seed bed, if the seed is lost among lumps and clods the result will be unsatisfactory. The land will require rolling before the seed is sown, and after sowing a set of light harrows should be run over the ground.

TIME TO SOW.

Where frosts are not too severe and the summer months dry and hot, the best time to sow is as early as possible after the autumn rains, say during April, when the soil is comparatively warm. The seed will germinate quickly and the young plant make considerable root growth during the winter and early spring, which will enable it to withstand the dry hot summer weather better. If it is not possible to sow during April or, at the latest, May, it is best left until September, when the weather becomes warm, and if the seed is then sown in well-prepared soil it will get the advantage of the spring showers and make some growth before the weather becomes hot. If, however, the summer turns out very hot and dry, the spring-sown lucerne will not have the same opportunity of withstanding the drought as the autumn sown crop. If irrigation can be applied, the spring sown crop can be helped along.

QUANTITY OF SEED.

This varies considerably. In some districts, a seeding of

from 15 to 20lbs. per acre is given, and in other districts equally good results have been obtained from $2\frac{1}{2}$ lb. The difference appears to be that the drier districts require less seed than a moist one. The smaller number enables the plants to stool out well and obtain a good root hold. A pound of lucerne seed contains about 210,000 seed. If 90 per cent. of them germinate, 20lb. per acre would give 3,780,000 plants, or 88 per square foot, a larger number than can possibly grow. I have always found that about 10lb. per acre sown broadcast, or 5 or 6lb. per acre drilled, is sufficient.

QUALITY OF SEED.

This is an important question. Only thoroughly clean seed should be purchased and care should be taken to see that it does not contain any dodder seed, as if this pest once gets into the crop it is ruined. If any doubts are held about the seed, a hundred grains should be counted out and placed between two pieces of flannel, which should be kept damp and in a warm place. In about 48 hours the seed will germinate and the percentage of good seed can be told by counting the number which have germinated.

Lucerne seed from several different centres is obtainable in the Eastern States, and the results from different seeds vary considerably. While experimenting at the Hawkesbury College I carried out a series of experiments with lucerne seed obtained from different parts, with the following results. The lucerne was sown in drills so that each variety could be kept separate. The plots were sown in September, first cutting February 29th, second cutting May 1st.

Plot.	Seed	...	...	1st Cutting.			2nd Cutting.		
				tons.	cwt.	qrs.	tons.	cwt.	qrs.
Plot 1.	Tamworth Seed	...	...	1	6	3	1	10	2
„ 2.	Singleton (Hunter River) Seed	...	...	0	12	2	0	14	1
„ 3.	English	...	...	0	17	3	0	16	3
„ 4.	Hungarian	...	...	0	19	2	0	9	3
„ 5.	U.S.A....	...	...	1	12	0	1	8	0

At the time of carrying out the experiment I made the following remarks:—

“At this early stage, however, there is no necessity to say anything as to their relative values as weight givers, beyond remarking that Nos. 1 and 5 gave the best returns. An interesting development has, however, taken place during the past season, that the results at present show greatly in favor of using seed obtained from acclimatised plants. We are accustomed to teach that acclimatised seed is more likely to give good results than such as comes from abroad, but we cannot always point to plants growing under conditions that prove the statement. Since the plots were sown we have had dry weather, and all through the summer the rainfall was scanty. During this dry period the young plants underwent severe treatment. The plants from introduced seed are very backward, and there can be little doubt

that the plants from acclimatised seed were better able to cope with the dry and exceptionable hot conditions ruling during the early part of the year. Plot 1 is most vigorous, showing splendid shoots 18 inches high. Plot 2 comes next, followed by Plot 5; then 3, and, weakest of all, Plot 4 last. It must be remarked, however, that Plot 4 (Hungarian Seed) was badly diseased during the latter time. This disease (leaf spot) was present on all the plots, but much more severely on No. 4 than the others, consequent, no doubt, upon the weaker condition of the plants in that plot."

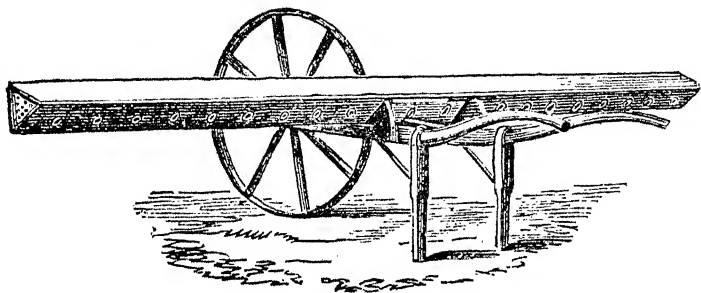
TURKESTAN LUCERNE.

In the year book of the Department of Agriculture, U.S.A., it is stated:—"The unusually severe winter of 1898-99 killed off probably half of the alfalfa of Western Kansas, Nebraska, Colorado, Wyoming, and many fields in the central prairie States to the Eastward were badly damaged, but the Turkestan alfalfa growing in the States mentioned was not affected. At the Wyoming experimental station a plot of Turkestan alfalfa was exposed for two weeks without injury to a daily temperature of — 35 degrees F., the lowest point reached being — 45 degrees F. In California it was subjected without damage to a drought which seriously injured ordinary alfalfa. In view of the notable success of this plant in withstanding drought and cold, it has been decided to purchase a large amount of seed grown in America from our imported stock and to distribute it widely over the arid West until it has been thoroughly tested under all the different climatic and soil conditions existing in that region. From the results already secured, it is believed that this one introduction will add millions of dollars to the annual hay product of the United States." This variety of Lucerne may prove of value to our dry Eastern districts and should be well worth a trial.

SOWING THE SEED.

Lucerne seed, being very small, is difficult to sow by hand, and to make a good even crop the seed must be sown by some sort of a machine. The machine shown in the illustration is the one I had in use at the Hawkesbury College farm, and is certainly the best and cheapest machine for sowing lucerne, or any kinds of grass and other small seeds broadcast, that I have ever seen. It consists of an ordinary light wheelbarrow frame, to which is attached a box 12ft. long, in which are 20 small holes for the seed to come through. The holes can be opened, more or less, as required according to the quantity of seed required to be sown. Inside the box is a long rod, to which are attached circular brushes opposite to each hole which keep the seed in circulation and force it out of the holes. This rod is kept revolving by a rod and spur wheels attached to the main wheel of the barrow. It sows a strip 11ft. wide, and is so light that when the ground is rolled a lad can push it as fast as he can walk. Three 11ft. poles are required with the machine, which are moved every

time the barrow comes to them. Twenty to thirty acres in a day can be sown with the machine if a boy is at hand to replace the poles for the next trip. I have sown rape, mustard, turnips, lucerne and all kinds of grass seed with this machine and found it to answer well. It was made by Messrs. R. Hunt and Co., and cost very little.



BARROW FOR SOWING SEED.

The seeds require harrowing in with a light harrow after being sown by the barrow. The question of sowing in drills or broadcast is one which requires consideration. I have carried out a number of experiments in connection with the question, and although there is no doubt that the seed sown in drills does best and gives a heavier yield, it has in practice a considerable drawback, in that the cultivated soil between the drills being kept well stirred to kill the weeds is always in a loose condition. When the lucerne is cut it is generally in a damp condition and falls on to the soft earth, which sticks to it, and when the crop is raked up for stooking, so much dirt is raked up with it that the hay is often discolored and of little value, whereas with the broadcast crop there is always a growth all over the ground and the hay can be kept much cleaner and brighter in color.

TREATMENT OF GROWING CROP.

Heavy stock should not be put on to a crop of young lucerne for the first season, as they trample it down and also pull up the young roots. If stock must be put on, sheep are the best to use, but it is far better to run the mowing machine over it when the crop is high enough. This will cause it to branch out, on the same principle as cutting back a tree. Stock should not be left on a lucerne crop for any length of time. Sufficient stock should be turned in to eat the crop down quickly and then removed and an opportunity given to the young shoots to make a growth. After the crop has been fed off or made into hay several times, the surface becomes hard with the constant tramping of the stock or by the weight of the implements used. A set of heavy harrows should then be run over the ground, or, if available, a disc harrow is a very good implement for this work. If the ground is very hard a light ploughing, three or four inches deep, and a good harrowing will not hurt it, and the crop will soon come up stronger than ever.

The crop is all the better for a good working up every second year. The roots being so deep in the soil, the cutting off the top of the plant with the plough does not seem to hurt it in any way. Where the roots only reach a short distance into the ground this treatment would be hardly advisable and discing and harrowing have to be resorted to. A system of soiling, *i.e.*, cutting the crop and carting to the stock, is much more profitable than turning the stock into the crop, as a large amount of waste occurs through the animals trampling a quantity of feed underfoot, especially is this the case in a very heavy crop. When the crop is cut or eaten down the old stalks die down and the fresh shoot comes up from the upper



PLANT SHOWING METHOD OF GROWTH OF THE GREEN SHOOTS.

part or crown of the root. The stems of many other forage plants when cut or broken, branch out above the ground, forming lateral shoots that immediately grow up and take the place of the old stems, but with lucerne the vitality of the roots may be much impaired if the young stems are grazed as fast as they appear, because the new growth comes directly from the root itself and not from the bases of the old stems.

MANURE.

Lucerne being a leguminous plant, obtains its nitrogen from the air, and therefore requires no nitrogen in the manure, and any

so applied is wasted, as it makes no increase in the crop. According to an analysis, lucerne ash contains 14.03 per cent. of potash, 13.68 per cent. of phosphoric acid, 50.57 per cent. of lime, and these are the ingredients which will require to be supplied. The easiest means of supplying these ingredients are by a mixture of 2 cwt. superphosphate, 2 cwt. kainait, or $\frac{1}{4}$ cwt. sulphate of potash per acre. The superphosphate supplies the phosphoric acid and lime and the kainait or sulphate of potash, the potash. A good dressing of lime or gypsum is also beneficial. If good returns are expected the crop will require a top dressing of manure every second year when the surface is worked up. This should be broadcasted over the surface and harrowed in if possible just before a shower of rain is likely to occur.

LUCERNE HAY.

A stack of good lucerne hay is a valuable asset to any farmer, and is especially valuable in that it affords the stock a change of food at a time when the principle feed is oaten or wheaten hay. Lucerne hay requires to be made quickly, as if left in the field only



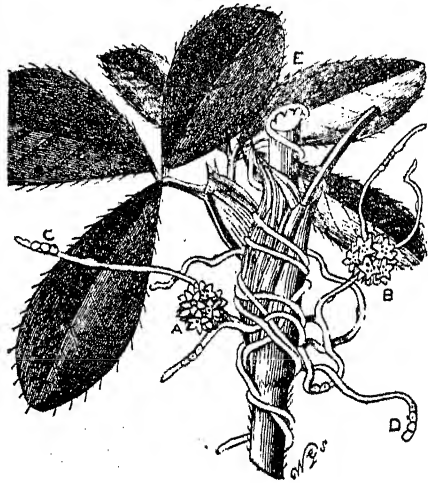
CUTTING LUCERNE FOR HAY.

a few hours too long the leaves become dry and fall off leaving only the stalks to cart in, and thereby greatly decreasing the value of the hay as a fodder. The lucerne should not be left laying on the ground in the hot sun for more than a few hours before being cocked up, and will stand being carted and stacked much greener than oaten or wheaten hay. Lucerne should be cut for hay at the

time the first flowers appear, after that period the stems become rapidly woody. A stack of lucerne hay will require to be covered or thatched as the rain penetrates very easily.

DODDER.

The great enemy of the lucerne plant is dodder (*Cuscuta trifolii*). It is a leafless annual parasitic on lucerne or clover. This remarkable plant sends its reddish or whitish silk-like filiform stems up the plant host and ultimately completely covers it. It supports itself by developing small warts near the nodes of the stem and by means of these it also depletes its host. When buying clover and lucerne seed care should be taken not to have dodder seed mixed with them. Dodder has been found on the flats near Cannington, and will want to be watched for on crops of lucerne. When it first makes its appearance, it may be destroyed by spraying with a solution of sulphate of iron, 1lb. dissolved in ten gallons of water. The treatment is not to be relied on, however,



DODDER ATTACKING LUCERNE PLANT.



good deal of trouble to check in time an outbreak of the disease.

unless care is taken to cut the infected patches before the parasite can produce seed from newly developed plants. If taken in time, the spread of the weed may be checked by encircling the affected patches with a trench and repeatedly turning the enclosed ground over with a hoe to destroy the young plants of the parasite as they spring up. Burn all infected plants to prevent the spread of the seed. As a lucerne paddock will last for a considerable number of years, it is worth while going to a

THE INSECTIVOROUS BIRDS OF WESTERN AUSTRALIA.

BY ROBERT HALL.

MALURI, OR BLUE, RED, AND WHITE-BACKED WRENS.

The brightly colored Wrens help to form a genus not found beyond Australia. Because of their rich voice and extraordinary beauty of form and color, they might be said to occupy an intermediate place between the Humming Birds and the Birds of Paradise. From an agriculturist's point of view the Wrens far surpass the other "Glories," and they are placed by nature just where they should be—mainly along the Southern parts of the Continent. Sixty large noxious grubs a day, and still waiting for supper time, is a record that only a Blue Wren (among Wrens) has so far been known to register. No wonder it should now be placed to stand the competition of the world's beauties, economically.

In Winter, as a rule, the gay attire is moulted, and a modest brown one is assumed. Again in Spring the males don the nuptial dress. Of the sixteen known species nine are found in this State. All of the Maluri can be divided, for our purpose, into three groups, the Red-backed, the Black-backed, and the White-backed. While the former is sparingly represented along the Northern part of the Continent, the latter is known by a single species to be a denizen of the salt bushes of the interior. The Blue-backed section is the strong one, numerically and in number of species.

GRACEFUL BLUE WREN (Superb Warbler).

Malurus elegans, Gld.

Malikos, soft; *oura*, tail; *elegans*, elegant.

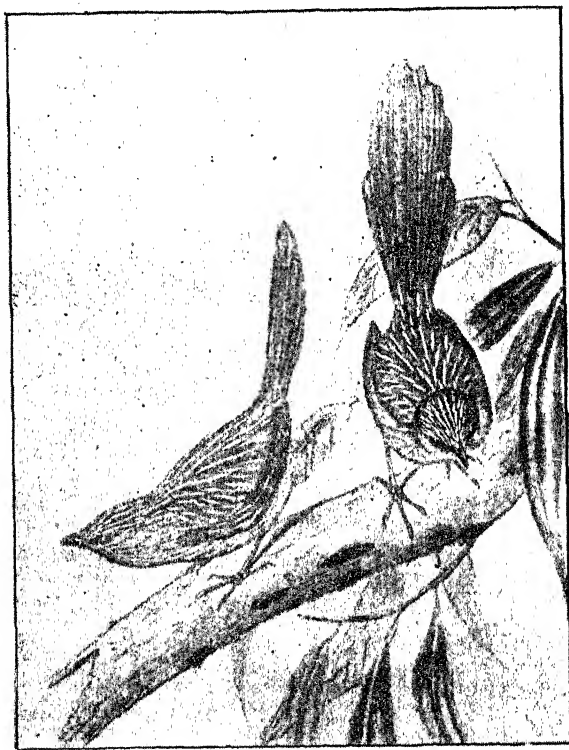
Malurus elegans, Gould, "Birds of Australia," fol., vol. iii., pl. 22. "Key to the Birds of Australia." Hall, p. 16 (1899).

GEOGRAPHICAL DISTRIBUTION.—Area 9.

KEY TO THE SPECIES.—Adult male: Head blue; throat black; scapularies chestnut-red; back beautiful silvery blue, a little lighter than eyebrow or ear coverts; tail longer than wing; bill about equal in height and breadth. Bill black; tail blue. Winter plumage similar to female. Adult Female: Sombre plumage, chestnutty bill and lores. Young: Similar to female in the early phase.

M. Elegans of the South-West of the Continent appears to me to live under the same conditions as *M. cyaneus* of the South-East of it. To the latter I have given special attention, and it will be interesting to know in what respect they differ from each other. An observation on the habits of a species will well repay any young reader of the JOURNAL. I feel sure we would all be glad of the results of his or her enquiry, carefully noted. These birds have wonderful appetites, and should be particularly useful to market gardeners. I have seen them busily eating the small *Plutella*.

moths in the early morning when the dew was still upon the grass. At such a time one in a family will usually expand its body feathers and become almost spherical in appearance; another will seem to rest lazily as much upon its tail as upon its feet, while the wings lie limp and disarranged. Under such circumstances the young show no fear, and leave all timidity to their parents. The staple articles of their diet seem to be grasshoppers, hard-winged insects and larvæ. The persistent work of my correspondent, Mr. Geo. Graham, as a skilled keeper of Blue Wrens in captivity, in the



GRACEFUL BLUE WREN (Superb Warbler).

providing of food, has proved that they are capable of disposing of 80 larvæ of the Cockchafer beetle (*Anoplognathus*) daily for months in succession. As to food supplied—quantity, preference, etc.—it was noted that from July to the 1st of January, grubs, with a little finely chopped meat, bread crumbs, small beetles and caterpillars formed the bulk of the food. It generally managed to dispose of 60 grubs, about a dozen small insects, and a small proportion of bread and meat, sufficient to equal the bulk of 100 grubs as named

above, per day. From 1st January to 1st April grasshoppers formed the staple, varied with March-flies and cockroaches (*Blatta*). The quantity devoured amounts to about the same as with the grubs, namely, 100 per day, and the immature form of the great green grasshopper (*Gryllus*) is preferred to all other kinds of food given to it. Moths, March-flies, and small-winged insects are greedily-devoured—in fact, it can stow away four large “blow-flies” on a fairly full stomach!

At the commencement of the breeding season the males show the greatest activity, for as many as five have been seen engaged in a pugilistic encounter to determine who shall claim the favored female. Nest-building usually takes place in September, and the



NEST OF WREN (Black-backed Section).

house is generally placed within three or four feet of the ground; occasionally in a thistle, but more often in some small bush. The period of incubation of *M. cyaneus* is 14 days, and the young fly from the nest on the eighth to tenth day, though sometimes remaining to the fourteenth. The brood of *M. gouldi*, the closely allied species, is usually three, consisting of one male and two females, as a rule.

Nest.—Dome shaped, side entrance; made of grasses, lined

with feathers. Like a'l the Wrens (*Malurus*) it places the nest near the ground.

Eggs.—Four or five to a sitting; white with bright reddish-brown spots upon them near or far apart, oftentimes forming a zone round the broad portion. Length 0.7 inch, breadth 0.5 inch.



NEST OF WREN (White-backed Section.)

VARIGATED WREN.

Malurus, Lamberti, Vig. and Hors. (Ma-lu'rus Lam-bert'i).

Malakos, soft; *oura*, tail; *Lamberti*, a proper name.

Malurus Lamberti, Gould, "Birds of Australia," fol. vol. iii., pl. 24. "Key to the Birds of Australia." Hall, p. 16 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas, 9, 8, 7, 6, 3, 2, 1.

KEY TO THE SPECIES.—Head blue; scapularies chestnut-red; back, fine cobalt blue of a different tint to crown; ear coverts and eyebrow richer turquoise blue than blue of nape; throat black. Female shows no blue or red.

The present species is well distributed over the Continent. Until the writer included it in a paper presented to the Australian Science Association in 1900, it had quite escaped notice as being a western bird. I found it abundant at and near Geraldton, and observed a nest in October. An error most probably has been made by taking *M. pulcherrimus* (Gld.) for this species. To me the only apparent difference in descriptions rendered lies in the color of the throat; one is deep blue, the other black. *M. pulcherrimus* is said to inhabit the central district, its nest and eggs having been found in a species of *Hakea* on the Wongan Hills.

While the Graceful Blue Wren is a denizen of the heavily timbered South-West, the present species is to be found in the light and dry lands. In economy they are much the same. Both

seek their food upon the ground, and show great activity in running after it.

The nest is placed very near the ground, and is well protected by shrubs, among which it is carefully hidden from view. Like the other members of the genus it acts as a foster parent to the smaller cuckoo, the young cuckoo ousting the rightful chicks, which die by cold or starvation.

Nest.—Dome-shaped; side entrance; made of grass and lined with feathers.

Eggs.—Four to a sitting; flesh white, speckled with reddish brown, especially at the larger end, where they form a zone. Length 0.6 inch; breadth 0.5 inch.

Space will not permit a lengthy reference to be made to each of our species, so that two have been chosen as typical of all the "Blues."

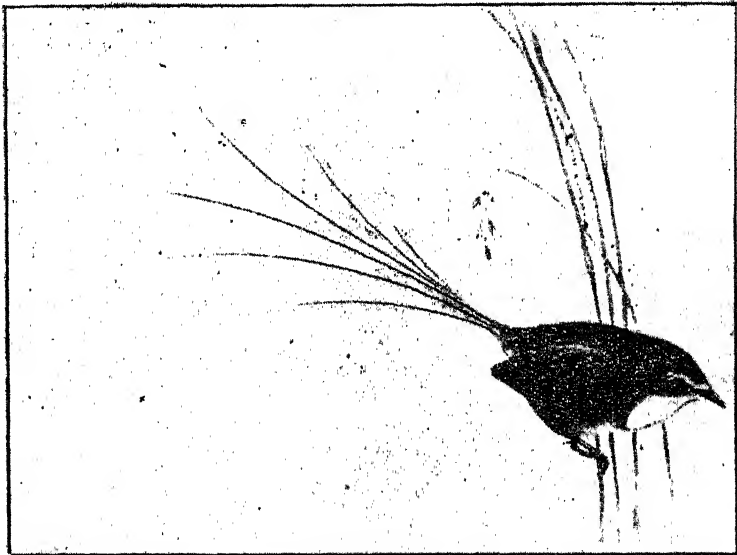
In the North (Pitzroy River) there are three other species that are extremely beautiful, one with white wings (*M. leucopterus*), a second with a red back (*M. dorsalis*), and the other with a purple crown.

When I handed preserved skins of the latter one for the first time I could not but marvel at the rare disposition of the head colors, just as that great deceased ornithologist, Mr. Gould, did 40 years ago. He says: "Charming as are many of the smaller Australian birds, I think the present species, *M. coronatus* (Purple-crowned Wren), is entitled to the palm for elegance and beauty, not only among the members of its own genus, numerous and beautiful as they really are, but among all other groups of birds yet discovered. The charm, too, is considerably enhanced by the great novelty in the style of its coloring, for in how few birds do we find the lovely lilac tint which encircles and adorns the head of this bird! A similar tint, it is true, appears in the nape of the Bower-birds (*Chlamy dodera*), but I scarcely know of a third instance!" The species referred to as *M. dorsalis* is a bird with a deep crimson back, and known as the Red-backed Wren. It is found all along the northern part of Australia. Our other species of the Blue-backed section are: (a.) *Malurus splendens*, Quoy and Gaimard Banded Wren. Leading Characters: Head, throat and upper tail coverts blue; wing coverts brown with bluish edges; no white shoulder spot; no black bar across rump; upper surface entirely rich cobalt. Habitat, area 9. (b.) *Malurus amabilis* (Gld.)—Lovely Wren. Leading Characters: Head blue; scapularies chestnut-red; back fine cobalt blue, of a different tint to crown; ear coverts and eyebrows rich enamelled blue. Habitat, areas 9, 2, 1.

EMU-WRENS AND GRASS-WRENS.

A reference to certain birds, as Wrens, gives one an idea of what we might expect to see. However there are "Wrens and Wrens" and the preceding article made mention of a genus, of which its members are structurally very much alike. For that reason they were grouped together to form the genus *Malurus*.

At the present moment we are attracted to birds that are not under that head, yet they are Wrens and near relatives. It has been generally thought the Emu-Wrens were inhabitants of the country south of the Swan and not north of it, but last year a new species was found by Mr. T. Carter in the Exmouth Gulf district. This came rather as a surprise to us because we have hitherto looked upon the single species as a bird fond of damp and sodden districts only. The Grass-Wrens are all partial to the dry tussocks and salt bushes of the interior. There they lead an active and useful life, being better known to graziers than any other people.



EMU-WREN.

Stipiturus malachurus, Lath. (*Stip-i-tu-rus mal-a-ku'rus*).

Stipes, a trunk; *oura*, tail; *malakos*, soft; *oura*, tail.

Stipiturus Malachurus, Gould, "Birds of Australia," fol. vol. iii., pl. 31. "Key to the Birds of Australia." Hall, p. 23 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas, 9, 5, 4, 3.

KEY TO THE SPECIES.—Tail of emu-like feathers; head light rufous, broadly striped with black towards the nape. Male has throat light blue, female rufous. Tail $4\frac{1}{2}$ inches; total length $6\frac{1}{4}$ inches.

It trusts to creeping and running among the bushes rather than to flying. As a matter of fact its wings are ill-adapted for this purpose, and when a visit is made to the class of land it inhabits one will at once recognise that it must be half its time unable to fly. This is owing to the saturated state of the leaves

causing its plumage to be too damp for active flying. Its voice is a make up of notes that approach a twitter more than a song, which is not to be compared with that of the Blue Wren. The breeding months are September and October, and it is surprising that no eggs are found later in the season. Certainly they are rare at any time. It is not unlikely November may be the latest month for breeding in the South-West district.

The illustration at once supplies an idea of the strange little bird called Emu-Wren because of its likeness to the large Emu's feathers and the small bird's habits. In nature it is not easily seen, keeping to the dense coarse grass and seldom rising above it.

Although some description was given of the habits of the species as early as 1865 ("Ibus") by Dr. E. P. Ramsay, nothing since in the way of extensive observation seems to have been made. Dr. Ramsay says: "I had for many days visited the swamps upon Long Island, where these birds are very plentiful, in the hope of finding them breeding; but it was not until the 25th September that I succeeded in discovering a nest, although I had watched them for hours together for several days. While walking along the edge of the swamp on that day, a female flew from my feet out of an overhanging tuft of grass growing only a few yards from the water's edge. Upon lifting up the leaves of the grass which had been bent down by the wind, I found its nest carefully concealed near the roots, and containing three eggs. They were quite warm, and within a few days of being hatched, which may account for the bird being unwilling to leave the spot; for upon my returning about five minutes afterwards, the female was perched upon the same tuft of grass, and within a few inches from whence I had taken the nest. It is of an oval form (but that part which might be termed the true nest is perfectly round), placed on its side; the mouth very large, taking up the whole of under part of the front. It is very shallow, so much so that, if tilted slightly, the eggs would roll out, being almost upon a level with the edge. It is outwardly composed of grass and the young dry shoots of the reeds which are so common in all the swamps near the Hunter River, lined with fine grass, roots, and, finally, a very fine green moss. It is loosely put together, and requires to be moved very gently to prevent its falling to pieces.

The eggs measure $6\frac{1}{2}$ lines long by $4\frac{1}{2}$ broad, sprinkled all over with minute dots of a light reddish brown, particularly at the larger end, where they are blotched with the same colour. One of the three had no blotches, but was minutely freckled all over. The ground-colour is a delicate white, with a blush of pink before the egg is blown.

The only note of the bird, besides a slight chirp when flushed and separated, is a slight twitter, not unlike a faint attempt to imitate the Blue Wren. While in the swamp, which at the time was nearly dry, I observed separate flocks; of these some were hopping along the ground, picking up something here and there;

others, whose appetites seemed appeased, were creeping along through the reeds about a foot from the ground, but as the reeds thickened I soon lost sight of them. They seldom took wing, except when disturbed, and not always then, seeming very averse to showing themselves. While watching them I observed one now and then hop to the top of a tall reed as if to get a glimpse at the world above. Upon coming suddenly upon a flock and following them, they keep to the reeds just in front of you, and never take wing unless hard driven, when they separate and do not collect again for some time."



STRIATED GRASS WREN.

The species lately described as new by Mr. A. J. Campbell is *S. ruficeps*, Lesser Emu-Wren. It differs from the previous species in having the forehead and crown rufous-brown. Total length 3.9 inches; wing 1.4 inches; tail 1.95 inches; bill 0.3 inch; tarsus 0.55 inches. It probably occupies the country between Champion Bay and the Fitzroy River, as a specimen of one or other species was observed by the Calvert Expedition. If it

proves as useful as an insect eater in the dry areas as the common form is known to be, much may be said in its favour.

Nest.—Small oval-shaped structure of grass as described above in one case. A second nest since discovered was compactly built.

Eggs.—As recorded above.

STRIATED GRASS WREN.

Amytis Striata, Gould (*Am'i-tis stri-a'ta*).

Amytis, a genus of Australian birds; *striated*, streaked.

Amytis striatus, Gould, "Birds of Australia," fol. vol. iii., pl. 29. "Key to the Birds of Australia." Hall, p. 23 (1899).

GEOGRAPHICAL DISTRIBUTION.—Areas 9, 7, 6.

KEY TO THE SPECIES.—General appearance rufous and much striped; each feather with a line of creamy white bounded on each side by black down the centre; upper plumage more rufous; chest striated, broad black cheek-stripe; rictal bristles five in number and not recurved.

Of the four known species, three inhabit the interior of this State. They pass their time among the low bushes, and are exceedingly active, carrying their tails in an erect position, very much as the Blue Wrens do. They keep in families of about five to seven in number, and appear to wander considerable distances in a day. About evening they apparently get back to their resting grounds of the previous day. In other words the species is local and active. Of the closely allied species (*A. textilis*) Mr. Gould says: "It is found in all those parts of the plain that are studded with shrubs, and clumps of a low shrub-like tree, resembling the Barilla of the coast, through and among which it creeps with astonishing rapidity. Indeed its mode of progression on the ground is such as no description can convey an accurate conception of, and must be seen to be understood. I cannot perhaps compare it with anything, unless with the motion of an India rubber ball when thrown forcibly along the ground. While stealing from bush to bush with this rapid movement, its head low and tail perfectly erect, it presents and exceedingly droll appearance. Like many others of its family, it seldom employs its power of flight. On my arrival in Australia fresh from Europe, these birds, and those of the preceding genus, were regarded by me with the highest interest, as they must be by every person not born and bred in Australia, who sees them for the first time in a state of nature."

The third species, *A. macrura* (Gld.), is one so closely allied to *A. textilis*, that more specimens are needed to set our doubts at rest. Considering it is found only in Western Australia, it is for local ornithologists to make clear the position. Mr. A. J. North, of Sydney, speaks of Gould's figure of *A. textilis* as a misleading one. It may represent young birds, and can stand for the female. "The under surface is slightly paler than the upper; no black stripe along cheeks; wing 2.3 inches."

Nest.—Open, and loosely made of grasses.

Eggs.—Three to a sitting; ground color white, zoned with pinkish spots at the larger end. Length 0.75 inch; breadth 0.6 inch.

Closely associated with the dry district Wrens is Carter's desert bird, *Eremiornis Carteri*, North. This was described last year for the first time. Found on the pastoral lands of Mr. Carter, and named in his honor as a field naturalist, I trust it will continue to prove of service, especially now that the species is publicly acknowledged as a member of the Insectivorous Birds of the State. A key to its plumage is of a specimen in the author's collection. Bill slender, tarsus short ($\frac{1}{2}$ inch); foot small; under tail coverts abnormally long; lores and a distinct eyebrow whitish; forehead rufous; ear coverts pale rufous brown, with distinct white shaft streaks; centre of breast and abdomen dull, buffy white; upper surface rufous brown; total length 5.65 inches; wing 2 inches (rounded). Habitat, Exmouth Gulf.

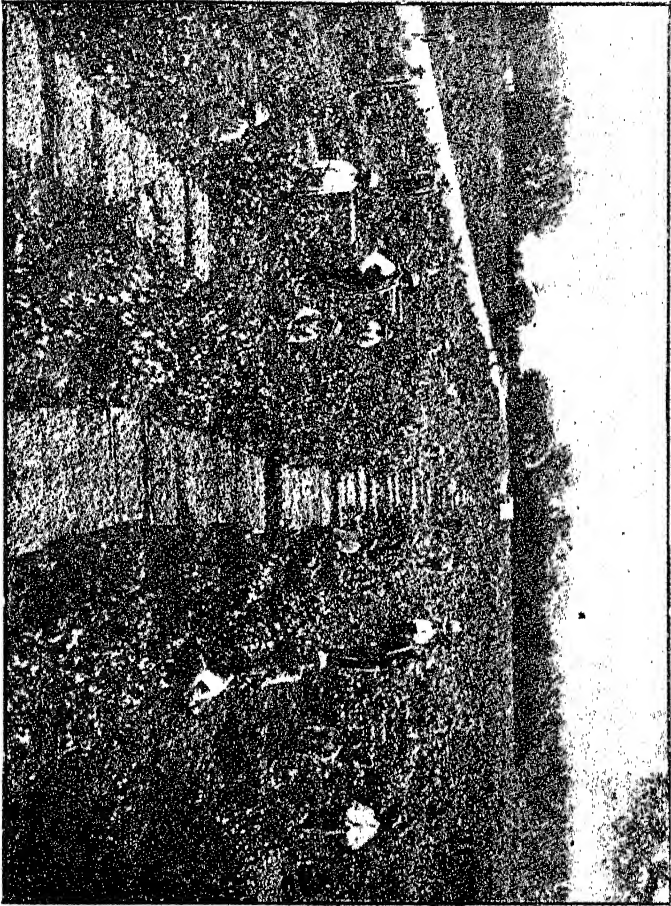
CALIFORNIA RAISIN CULTURE.

From the *Scientific American*.

The city of Fresno, California, with a normal population of 20,000, contains in the season 45,000, all working from daylight to dark, engaged in cutting, drying, packing and shipping the crop of raisins. The soil combined with certain essential climatic peculiarities makes the region particularly adapted to the growth of the native grape. For eight months of the year rain never falls. The warmth of the soil absorbed in this long period of sunshine imparts to the fruit that excess of saccharine quality which it requires, while the curing and drying of the grapes in the field is permitted by the prolonged heat. Added to these advantages is an inexhaustible supply of water for irrigating, drawn from the high Sierras, under the perfect control of the vineyardist, and rendering him independent of drought or abbreviated rainfall at all times.

The raisin industry, up to within twenty five years, was a monopoly of Southern Europe and the chief dependence of a great population. That in so brief a period this important industry could be transplanted to distant California and the methods of Spanish cultivators improved in such a measure as to displace foreign importations altogether is another miracle of American enterprise. Spain has still the advantage of cheap labor.

The cultivation of the raisin grape differs in no essential particular from the methods employed in bringing the wine to its present perfection in California vineyards which have been described in detail in previous numbers of the *Scientific American*. It is a process of ceaseless industry and never failing vigilance, the



PICKING AND DRYING RAISINS IN THE FIELD, CALIFORNIA.

fruit of minute observation and scientific experiment. Beginning in early winter, the vines are pruned close to the ground and each succeeding month, up to the first of June, finds the growers industriously engaged in cultivating, sulphuring and pruning again, with the object of protecting the vines from the attacks of insects or rust and of getting out of the soil and forcing into the maturing fruit the greatest nourishment without at the same time exhausting or weakening the vines. Superfluous bunches are cut off. The size and not the number of these is the aim of the most successful grower.

The climatic conditions in the raisin district are of the utmost importance to the successful prosecution of the industry. The season's rainfall in Fresno averages about 8 inches, beginning in November and terminating in May. But the growers here are entirely independent of nature's supply of moisture. The varieties of grapes chiefly planted are the Muscatel de Gordo, Blanco, Muscat of Alexandria, Sultana and Thompson's Seedless. It takes on an average three and one-half pounds of green grapes to make one of raisins. The yield per acre is about five tons of green, or one and a quarter of the dried fruit.

The average amount of sugar in the raisin grape is from 25 to 28 per cent., depending upon the soil, season and amount of water supplied. Vines are planted eight and ten feet apart, and closer when the richness of the soil admits.

The season's gather of the grape begins the latter part of August. There are 42,000 acres of vines in Fresno County, and one man to the acre is the rule. The clusters are handled by the stems alone, as contact with the hands robs the product of its sightliness. As fast as picked the grapes are deposited in trays 2 by 3 feet in size holding about 20 pounds. These trays are laid between the vines, sloping towards the sun. Here they lie for six or eight days, when they are turned over by the simple process of placing one tray on top and reversing. The sun curing takes altogether from ten to twelve days, when the grapes are taken to the packing house to endure the sweating process. The sweat boxes are somewhat larger than the trays, and 8 inches deep. The sun-dried grapes are transferred to these boxes, a sheet of paper being laid upon the bottom and a layer of grapes placed on this, paper and grapes alternating until the box is full. The loaded sweat boxes are then carried to the equalizing room, a dark, airtight apartment, well-ventilated; the boxes are piled on top of each other, and remain for fifteen to twenty days until thoroughly sweated.

In this process the moisture in the raisin is evenly diffused; when the product emerges, it is about ready for market. In handling, much fruit falls from the dried stems and is marketed as "loose." These are put in a "stemmer," where they are divested of the stems and mechanically sorted into four grades.

The bunch raisins are generally packed in twenty pound boxes. This is a careful operation and is generally intrusted to women and girls.

Within the past three or four years a new product known as the California seeded or stoned raisin has been put upon the market, and has rapidly attained popularity among consumers for its many obvious merits.

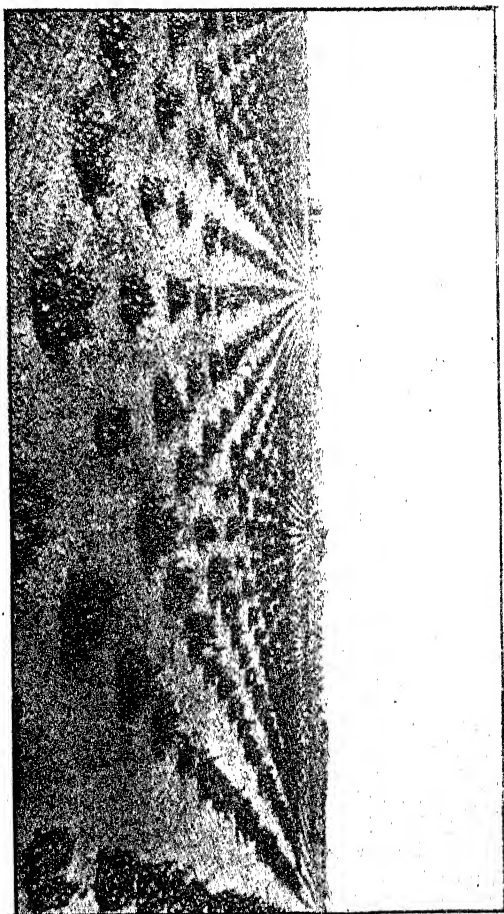
In 1896, the stoned raisin was put upon the market. The raisins are prepared for seeding by first being subjected to a drying temperature of 140 degrees for five hours, after which the fruit is submitted to a chilling process, and while in this condition is passed through a cleaning and brushing machine, which removes absolutely every particle of dirt, including the cap stems. It is then taken to a room and spread out on wire trays in a temperature of 130 degrees which brings the fruit back to its nominal condition. In this process the berry is converted into pectin, that delicious jelly which gives to fruit its best flavor.

The raisins being thus submitted to alternate heating and chilling, are prepared to endure all climatic influences and to keep indefinitely. They are then passed through the seeding machines, which have a capacity of from ten to twelve tons daily. In the operations, raisins are pressed between rubber-surfaced rollers, which at first flatten the berry and press the seeds to the surface, when an impaling roller catches the seed between the needles and teeth affixed to its periphery and removes them from the fruit, which passes on, minus only the seed. The product is then packed in one-pound paper boxes and afterward in packages containing thirty-six, convenient for marketing. The extraction of the seeds leaves the fruit intact, without mutilation.

It is expected that Fresno will ship this year about 2,500 carloads of raisins alone.

We reproduce plates illustrating the ploughing after pruning, the vines showing three months' growth, and the picking and drying of the ripe raisins.

IMPORTATIONS OF LIVE STOCK AT FREMANTLE.—The following return discloses the importations of live stock at Fremantle during the first three months of the year, the statistics for the corresponding three months of last year being given in parenthesis:—Horses, 233 (106); cattle, 2,961 (2,784); sheep, 15,964 (20,870); pigs, 768 (785); dairy cows, 99 (83); bulls, 25 (0); rams, 384 (5); and dogs, 31 (16). The return does not include any live stock from the Kimberley district. As a matter of fact, this year's shipments from Kimberley have not yet commenced.



RAISIN VINEYARD, CALIFORNIA.

THE INJURIOUS EFFECTS OF CERTAIN GRASS SEEDS TO LIVE STOCK.

By J. D. STEWART, M.R.C.V.S., Government Veterinary Surgeon,
Stock Branch, Sydney.

The seeds of certain grasses have been responsible for a considerable amount of discomfort and injury to live stock in many parts of the State during the past three months. In sheep, on some holdings, they have been a common cause of death.

The seeds reported as causing the most harmful effects are those of the barley grass, the corkscrew or spear grass, and the grass called No. 9. The awns of the seeds of these grasses are naturally well adapted for penetration.

Grass seeds affect horses and cattle principally by working into their eyes or penetrating their mouths. In sheep they seem capable of also passing into the body from any part where the skin is thin.

When a grass seed works into the eye of an animal it produces a considerable amount of irritation, indicated by a copious flow of tears, swollen, and half or completely closed eyelids, and an inflamed appearance of the eye itself. Often a white scum forms over the front of the eye, and the organ may become permanently damaged. The condition produced by grass seeds must not be confounded with that known as "Epizootic Ophthalmia," a disease of a contagious nature which demands further investigation.

Horses occasionally suffer from the awns of grass seeds penetrating the mucous membrane of their mouths inside their lips, the gums between the teeth, and just at the junction of the gums with the teeth. As a rule, several awns are found penetrating at the one spot, through a small round abrasion. In the worst cases the inside of the mouth fairly bristles with projecting awns. The irritation produced causes an amount of inflammation which interferes with the proper mastication of food, and the animal rapidly loses condition. Attention is usually drawn to the presence of this affliction at an early stage by the animal acquiring a daintiness in feeding. Later on it is noticed that the horse chews his food longer than usual, and slobbers considerably. In bad cases the lips become enlarged and pendulous, and allow the saliva to freely escape. Moreover, the odour from the mouth is decidedly unpleasant. By opening the horse's mouth and examining inside the lips, the gums about the teeth and the folds under the tongue, the cause is readily observed.

The primary ill-effects of penetration of the mucous membrane of the mouths of cattle are not so acute as in the horse. There is not the same painful condition present, due, no doubt to the greater thickness of the lining membrane. The ultimate ill-effects, however, are more serious, and diverse opinions may be expressed as to their exact nature, as the following case will serve to illustrate:—

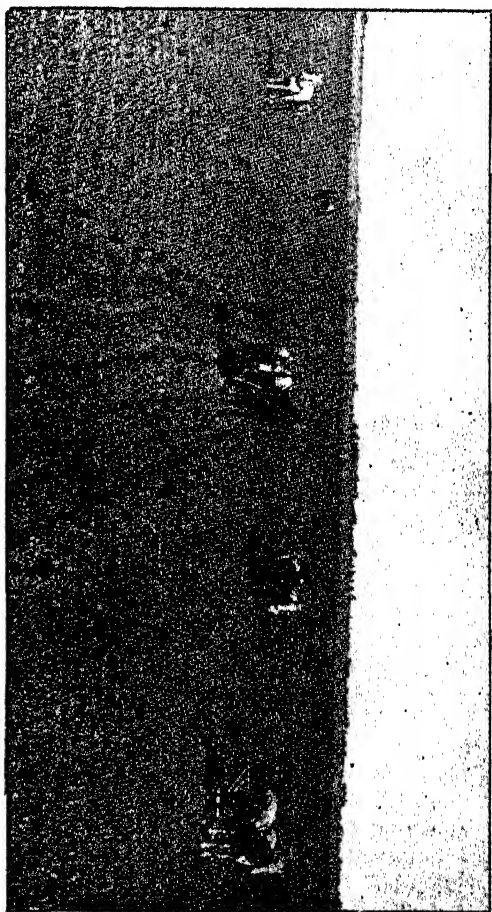
Recently Mr. C. K. Hudson, Inspector of Stock for the Cooma district, reported that some cattle, the property of Mr. C. Harnett, of Rosebrook, had within the past few months developed swellings on the jaws, and between the lower jaws, and as they were dairy cattle Mr. Harnett had isolated them, and was anxious to ascertain whether they were suffering from tuberculosis. Mr. Hudson at the time stated that he was inclined to believe that the swellings were due to either actinomycosis or irritation, produced by seeds of barley grass penetrating the jaws from the mouth. Subsequently I was instructed to apply the tuberculin test to these cattle, and ascertain the exact nature of the swellings.

On an inspection being made of four of the worst cases, it was ascertained that although the animals were on the whole in fair condition, they all had pronounced swellings about the head. These swellings or enlargements took the form of deep-seated abscesses, situated either under the ear in the parotideal region, on the jaw, or between the lower jaws. A pronounced dropsical effusion between the lower jaws also existed, which, I understand, was even more evident some time back. In one or two cases there were indications that the abscesses had burst, and partly discharged. As a rule each beast had more than one enlargement. The swellings were not painful, and were not attached to bone.

The tuberculin test was applied to these animals, and several of their progeny without a reaction occurring.

With Mr. Harnett's consent, a roan cow, that had been tested, was killed for the purpose of holding a *post-mortem* examination. This cow had an unthrifty appearance, and suffered from three enlargements, one being below the ear, another beneath and between the lower jaws, and a third lying in the muscles of the jaw, in a line with the lower molars on the left side. During the autopsy the internal organs and the principal lymphatic glands were examined without the slightest trace of tuberculosis being discovered. On removing one of the jaws, and examining the head, the mucous membrane of the mouth was found to be pierced in numerous places by seeds of the barley grass. The seeds had penetrated beneath the teeth, through the gums, along the base of the tongue and through the cheeks. The seeds that were removed had a foetid odour. On the enlargements being cut down upon they presented the appearance of encysted abscesses of long-standing. Although they did not present the characteristic appearance of actinomycosis—being superficial and not firmly attached—still as it is known that cattle are sometimes inoculated with the micro-organisms of this disease by awns of grass seeds penetrating the mucous membrane of the mouth, specimens of the affected parts were collected for microscopic examination. This examination failed to reveal any indication of the presence of actinomycosis, although abundant micro-organisms, such as are usually found in ordinary abscesses, were easily detectable.

The result of the investigation indicated that the enlargements



RAISIN VINEYARD AFTER PRUNING, CALIFORNIA.

were due to the seeds of barley grass penetrating the mucous membrane of the mouth, and thus allowed access to pyogenic micro-organisms which gave rise to abscess formation.

The harmful effects of certain grass seeds to sheep are even more serious than to horses and cattle. This is probably due to the presence of wool, the thinness of the skin, and tenderness of the flesh. Most sheep-owners are familiar with the inflamed condition of the eyes, often followed by blindness, which sheep suffer from grass-seeds. For sheep to actually die in large numbers from the effects of grass seeds penetrating their system is fortunately not of common occurrence.

During last month, Mr. J. C. Faulkner, Acting Inspector of Stock, at Urana, reported that of a mob of 800 sheep 500 suffered severely, although all were affected to a greater or less extent from penetration with grass seeds, especially those of the barley and corkscrew or spear grasses. The affected sheep rapidly wasted and continually lay down. The skin and flesh about the abdomen, brisket and neck, became riddled with grass seeds, causing great irritation and shedding of fleece. Constitutional disturbances set in, and the sheep die. On examining the carcasses Mr. Faulkner found the bowels inflamed and pierced by a number of spear grass-seeds, which had penetrated through the skin and walls of abdomen from without.

TREATMENT.

The best preventive measure to adopt is obviously the eradication of obnoxious grasses. If this cannot be carried out, it is recommended that stock should not be depastured in paddocks where these grasses prevail during the time they are in full seed. This should be particularly observed in connection with young stock, and others recently introduced into districts where these grasses grow, for it has been noticed these are the animals that become most severely affected. Old animals reared in the district escape injury to a great extent, as they have probably learnt from past experience what grasses are best avoided.

When the eye of an animal has become affected, the cause should be removed and the eye cleaned. In sheep it is often necessary to clip away in the ingrowing wool. Medicinal remedies may then be applied, either in the form of a powder or a lotion. A very efficacious powder is prepared by mixing thoroughly one part iodoform, one part burnt alum, and two parts boracic acid. A small quantity of this powder should be blown into the eye by means of a quill every second day until the eye is healed. The following prescription makes a very servicable eye lotion for the horse:—

R Sulphate of zinc, grs. viii.
 Ac. boracic, grs. xv.
 Tinct. opii, add 3 ij.
 Aqua dist., add 3 ij.
 Mix and make lotion.

The lotion, which should be well-shaken before use, to be applied twice daily by means of a small camel hair brush or a clean feather.

In treating an animal whose mouth has become affected, the best method is to cast it and place a gag in its mouth. A thorough search can then be made. All awns of grass-seeds found should be carefully removed by means of a small pair of plyers or forceps.

After the operation the mouth should be well washed out with a solution containing boracic acid and alum in the proportion of one ounce of each to a quart of water. The best way to wash the mouth out is to elevate the animal's head and give the solution as a drench, but instead of holding the head up for the animal to swallow, lower it, and allow the animal to play the solution throughout its mouth by means of its tongue. In bad cases the mouth should be washed out at least twice a day.

Abscesses which form in cattle should be opened when they mature, and treated in the ordinary way. The application of a strong blister often hastens their progress.

The dropsical swellings which often occur between the lower jaws of cattle, and which are characterised by pitting on pressure being applied to them, are not of great importance, and will pass off when the other more serious manifestations are attended to.

Sheep suffering from penetration with grass seeds should be shorn and dipped in some reliable disinfectant sheep dip before constitutional disturbances become manifest. When possible, each sheep should be examined separately.

It is a difficult matter to treat a large number of sheep, but by removing the animals off pasture where these grasses are in full seed, affection to sheep can be avoided.

AMERICAN AGRICULTURE AND LIVE STOCK.

The nineteenth century has been remarkable in this field chiefly for the great addition which it has made to the national wealth of the United States, America, the agencies which have contributed to this increase, and the means for economising the cost of production. At the beginning of the century a little patch of ground, oftentimes a mere clearing in the forest, and a few domestic animals occupied the attention of the farmer, while the crudest of implements aided him but slightly in his work. At the end of the century 5,500,000 farms were producing annually 2,078,143,933 bushels of corn, 547,303,346 bushels of wheat, 796,177,713 bushels of oats, 228,783,232 bushels of potatoes, 56,655,756 tons of hay, and 10,000,000 bales of cotton. To-day the great Western wheat farms of forty-five to ninety thousand acres, and the processions of self-binding reapers in the harvest field stand as correlated factors of growth. More than ten thousand patents for ploughs, as many for reapers, and a proportionate

number of planters, cultivators, thrashers, and other implements and tools, indicate the vastness of this field of activity.

Of live stock the United States has, in 1900 13,537,524 horses, 2,086,027 mules, 16,292,360 milch cows, 27,610,054 other cattle, 41,833,065 sheep, and probably 37,000,000 hogs. The great dairy interest and the enormous meat packing establishments are founded upon these. In the Year Book of the Agricultural Department of the United States the estimated quantity and value of dairy products for 1899, is:—Butter, 1,430,000,000 pounds, cheese, 300,000,000 pounds, milk, 2,090,000,000 gallons. This, with the skim milk, buttermilk, and whey, and the calves dropped annually, makes the produce of the dairy cows exceed \$500,000,000 (£100,000,000) annually. During the period covered by the five fiscal years, 1895 to 1899, the United States exported nearly \$3,500,000,000 (£700,000,000) worth of domestic agricultural produce. The average annual value reached \$694,874,000 (£138,974,800). The agricultural exports for 1900 reached the sum of \$835,858,123 (£167,171,624 12s.). What the full production will be in this great field remains for the 12th census to disclose. Seven hundred clerks in the one division of agriculture alone have been busy for some months tabulating the statistics. This number will soon be raised to one thousand, but not until June, 1902, will the work be complete.—*Scientific American*.

THE USURPATION OF THE NAMES OF FRENCH GROWTHS.

Under this heading, the *Revue de Vins et Liqueurs*, of Paris, devotes a special article to the recent decision come to by the jury of Class 60, at the Paris Exhibition, concerning such foreign wines as have usurped the names of French growths, quoting in the first place, as follows, the text of the decision itself, viz.:—"Such wines and wine brandies, whether French or foreign, as are shown under labels bearing a false indication of origin ought not to be examined by us, and cannot therefore compete for any award." Our contemporary says—

"The Bordeaux people, at the expense of whom this unfair competition takes place in Australia and America in the matter of Claret, Medoc, and Sauterne wine, are very naturally indignant at the absence of all scruple on the part of the Australian and Californian in thus usurping the designation of their growths. If wine-growing France wants to get a clear perception of the abusive use of the names of national growths and wine-growing districts, she must calmly examine the ideas which are prevalent abroad on the subject, and then oppose the same, and get them replaced by others more in keeping with reality and commercial fairness.

Abroad, and particularly in countries where wine is not grown, the use of false indications of geographical names is considered as being quite permissible; they do not remove the usurpation of the names of growths, which are private property, that being only a venial sin in the eyes of some people. The indifference is brought about by a general idea which must be incessantly refuted; to wit, geographical denominations, such as Bordeaux, Medoc, Cognac, Saumur, Champagne, Burgundy, Chablis, are collective expressions corresponding to modes of manufacture easy to imitate. So, when foreigners disapprove of the usurpation of the names of particular growths, of Bordeaux Chateaux for instance, it is because they see in such usurpation wrong-doing as to private property.

They are not aware that collective denominations have acquired a reputation, and consequently a commercial value, superior to that of the other beverages before the names of the particular growths became known. It was neither Chateau Margaux nor Chateau Yquem which made the general reputation of Bordeaux wine, nor the Hospices wines which made the reputation of the wines from the Beaune hillsides. It was the particular aptitude of the soil of Bordeaux or of Burgundy to produce a sort of wine endowed with special qualities, which cannot be found anywhere else.

The great French growths are Bordeaux or Burgundy wines, which represent the acme of the qualities required of Bordeaux and Burgundy wines. To give to a wine grown in Landes or Franche Comté the quality of Burgundy would be causing serious prejudice to all growers of these districts, and to all the merchants holding the genuine wines. It matters but little whether the wine is of American or French origin. There is bad faith and prejudice caused to the final buyer. He will pay dearer for the wine on account of the label it bears, and the inferior quality of the wine will give him a false idea of what genuine Burgundies and genuine Bordeaux are.

And the fact is, it is quite a mistake to think that all soils suitable for the cultivation of the vine are capable of growing identically the same wines as those of Bordeaux, Champagne, Burgundy, or of producing identically the same brandies as those of Cognac. The particular qualities which belong to these wines alone, are the combined result of the climate, the species of vines, the way in which the vines are cultivated, and the care with which the wine is made. Thus, there are pinot or pineau vines in a great many parts of France. Nowhere, however, save in Burgundy, is there any pretension to make Burgundy wine, even on the part of growers infatuated about their wines, and however near to Beaune or Nuits such growers may live. That is the example we may give to convince those Californians who say that their white wine must be Sauternes if their vines are the same as those of the Bordeaux district of that name.



RED POLLED NORFOLK BULL.

Imported by Messrs. Connor, Deherly & Durack. Particulars of this Bull appeared in last month's JOURNAL.

The owners of the great growths are far from getting the great qualities of their vines for nothing; they harvest but few of such wines, great-growth vines giving but little fruit on account either of their nature or of the mode of pruning the same, or of the limited number of vines planted in a given area. Nor if high prices are obtained are they got for nothing. The sacrifice becomes greater still when a crop does not succeed in the matter of quality, and obliges its owner to withdraw it from the trade in order not to bring about a depreciation of his brand.

The special reputations of growths have been formed in the same manner as those of viticultural districts. When a grower in Bordelais or in Champagne, on account either of the care taken in gathering the grapes, or in making the wine, or of the bad crops sacrificed, has been able to make a reputation in the trade superior to that of his neighbours, he has made for himself a brand, he has secured for his future crops a higher price than those given to his fellow-growers of the same province, of the same canton, of the same township.

But it is a mistake to think that the reputation and the value of his wines come from his efforts and personal sacrifices alone. Assuming that the cleverest grower in all Bordelais were to go outside the Gironde department with Cabernet, sauvignon, semillion, and other vines used in Bordelais, and to establish a vineyard in Algeria on land similar to that of palus or of graves, that he were to cultivate, vintage, press, put in cask, and treat his wines in the same manner as those of his Chateau in Bordeaux, he would never think of giving to his new vineyard the name of his Chateau, nor would he ever succeed in getting from the trade similar prices, however great his reputation for fairness and competency might be.

The names, the intrinsic value of the great wines of France, are inseparable from the place they really come from. The reputation of the great growths is nothing more than a derivative, a quintessence of the reputation of the province. That is so to such an extent that no great French growth is in the enjoyment of a national or universal reputation outside Burgundy, Bordelais, Champagne, and a few other secondary districts. But it is never to the special value of the vineyard that the latter owes its lustre, but to that of the district or township, of which it produces in the highest degree the essential qualities. So foreigners are quite mistaken when they imagine it is possible to make outside France, Bordeaux or Champagne wines. Such a thing is impossible, because the French themselves do not do it either in France or Algeria. And yet our countrymen had a fine opportunity of making Bordeaux or Burgundy wines when they undertook twenty years ago the viticultural colonisation of North Africa: they never had even the thought of doing so, such a thing being too strange and dishonest for that. Some of them have honestly succeeded in

establishing growths. Thus the wines of Medea and Nador have acquired a reputation and prices out of all proportion with those of the other wines in Algeria. This reputation is entirely due to the remarkable quality of the wines harvested in this part of Algeria.

The Medea wines may possibly become some day as celebrated as are the Bordeaux wines. But in case they acquire such an advantage, they will own it exclusively to their natural qualities and to the care taken by the growers.

RAISING TURKEYS.

1. Never let the young turkeys get wet. The slightest dampness is fatal.
2. Feed nothing the first twenty-four hours after they are hatched.
3. Before putting them in the coop, see that it is perfectly clean and free from lice, and dust them three times a week with insect powder.
4. Be sure the hen is free from lice. Dust her, too.
5. Look out for mites and the large lice on the heads, necks, and vents. Grease heads, necks, and vents with lard, but avoid kerosene.
6. Nine-tenths of the young turkeys die from lice. Remember that.
7. Filth will soon make short work of them. Feed on clean surfaces. Give water in a manner so that they can only wet their beaks.
8. The first week feed a mixture of one egg (beaten) and sifted ground oats, mixed, with salt to taste, and cooked as bread; then crumble for them, with milk or curds, so that they can drink all they want. Feed every two hours early and late.
9. Give a little raw meat every day; also, finely chopped onions or other tender green food.
10. After the first week, keep wheat and ground bone in boxes before them all the time, but feed three times a day, on a mixture of cornmeal, wheat middlings, ground oats, all cooked, and to which chopped green food is added.
11. Mashed potatoes, cooked turnips, cold rice and such, will always be in order.
12. Too many hard boiled eggs will cause bowel disease.
13. Remove coop to fresh ground often in order to avoid filth.
14. Ground bone, fine gravel, ground shells, and a dust bath must be provided.
15. Finely-cut fresh bones, from the butcher's, with the adhering meat, is excellent.
16. They must be carefully attended to until well feathered.
17. Give them liberty on dry, warm days.
18. A high roost, in an open shed, which faces the south (north here), is better than a closed house for grown turkeys.

19. A single union of a male and female fertilizes all the eggs the hen will lay for the season; hence, one gobbler will suffice for twenty or more hens.

20. Two-year-old gobblers with pullets, or a yearling gobbler with two-year-old hens is good mating. Gobblers and hens of the same age may be mated, but it is better to have a difference in the age.

21. Turkeys can be hatched in an incubator and raised to the age of three months in a brooder, but only in lots of twenty-five, as they require constant care.

22. Capons make excellent nurses for turkeys and chicks.

23. It is not advisable to mate a 40-pound gobbler with common hens, as the result will be injury. A medium sized gobbler is better.

24. Young gobblers may be distinguished from the females by being heavier, more masculine in appearance, more carunculated on the head, and by a development of the "tassels" on the breast. A little experience may be required at first.

25. Adult turkeys cannot be kept in confinement, as they will pine away. By feeding them in the barnyard a little, night and morning, they will not stray off very far, but they cannot be entirely prevented from roaming, and the hen prefers to make her own nest.—*Poultry Keeper*.

ANOTHER NOXIOUS WEED.

The following extract from a weekly paper calls attention to a Noxious Weed which is likely to cause considerable trouble in Victoria in the future:—

"Among the many noxious weeds that have caused trouble and loss to landowners of this State few are more stubborn or rapid growing than the plant known as St. John's Wort, which was introduced to the Bright district, Victoria, about eight years ago by a woman who at the time became possessed of a desire to grow it in her garden, and accordingly had a plant sent to her from England. It grew well and rapidly took possession of the garden, whereupon it was dug out and thrown over the fence. It took root in the grass land, and multiplied in a few years with a rapidity which, though surprising caused no alarm, owing to its noxious character not being suspected by the district landowners. It was not until many acres had been completely covered by the weed that the farmers commenced to concern themselves about it, and the government sent Mr. French who, in addition to being Government Entomologist, is also a botanist of twenty-five years' Government experience, to report on the matter of bringing about the extirpation of the new pest. No work in this direction has been done since that time, and now it is estimated that fully 10,000 acres are covered with the weed to the almost complete exclusion of fodder

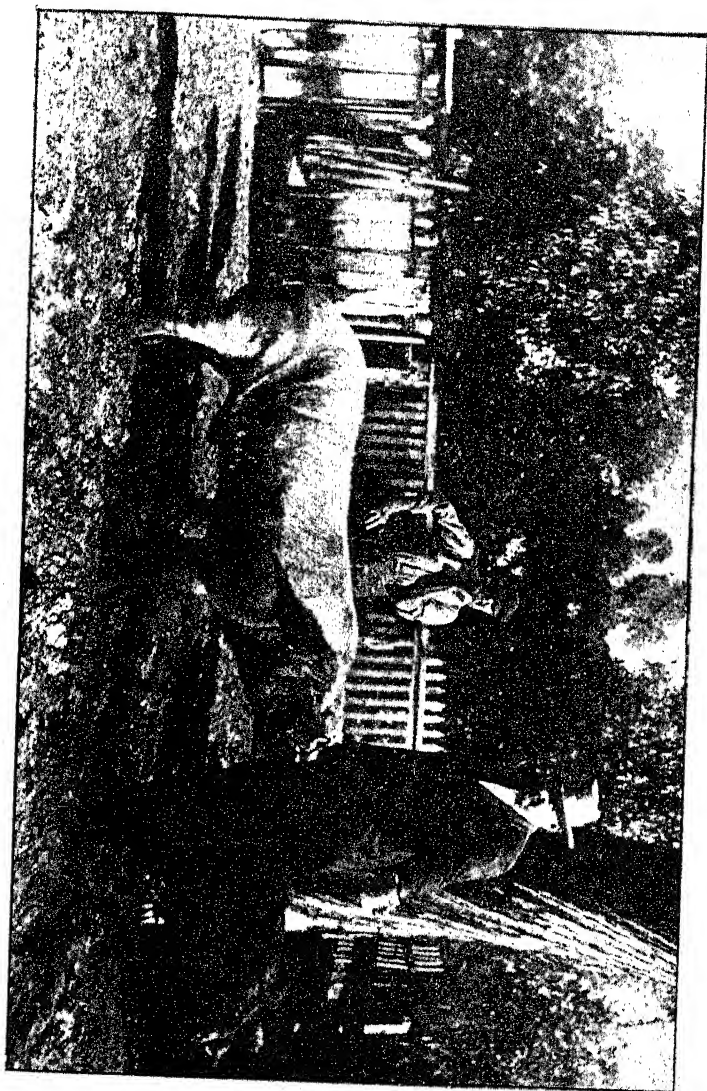
plants. When it is mentioned that for many years the Bright district was largely favored as a grazing place for cattle being got ready for the fat stock market, and that now few, if any, beasts are sent there in consequence of the paddocks being overrun with the St. John's Wort, the extent of the loss sustained by landowners through the act of a thoughtless woman will be realised. Mr. French says the weed is one of the worst he knows of, and he estimates that it would require several years of constant attention and the expenditure of thousands of pounds to bring about an entire eradication of the plant. "It will have to be done" says the gentlemen named "sooner or later," otherwise a valuable estate will be lost to the country, and probably the area will be increased as time goes on. This is a sensible view, but no doubt the Government of Victoria will act herein as they have in respect to many other matters, viz., refuse the "stitch in time" which "saves nine," and ultimately spend hundreds of thousands of pounds in labours which will prove but partly effective"—*Town and Country Journal*.

With regard to this pest the Government Botanist reports. The St. John's Worts are small shrubs or undershrubs, species of *Hypericum*, found as natives in the woods of Great Britain, and sometimes cultivated in gardens. They are readily recognised by their leaves, which are in opposite pairs and marked by pellucid or black dots, and also by their large yellow flowers. The family *Hypericaceæ*, is represented in the Australian flora by one species of *Hypericum*, a small undershrub to be seen in small shaded woods, but not likely to cause trouble to the cultivator. No species of *Hypericum*, has yet been reported to the department as objectionable or otherwise, but if the sort described in the paragraph above should exist in any garden it ought to be carefully watched, and a specimen forwarded for identification.

LARGE YORKSHIRE BOAR, BOXER I.

The large Yorkshire boar, Boxer I., illustrated, was imported from England by Mr. Stubbs, of Perth, in 1900. He is just two years old and was bred by the well-known Nottingham breeder, Mr. P. L. Mills. He is sired by Battlesford Ranger III. (3443) Yorkshire stud book, out of Battlesford Lass 16th (1355) Yorkshire stud book.

EXPERIMENTAL SEEDS.—Farmers may be reminded that the Department of Agriculture is able to provide them with small samples of some seeds not usually supplied by the trade, for the purpose of experimental cultivation. These include exotic grasses, salt bushes, and other fodder plants, all of which ought to be sown before the rainy season is over, and application should at once be made to the Department for supplies; so that the seeds may be received in time for sowing towards the end of the winter season.



YORKSHIRE BOAR, "BOXER I."
See Page 396

POULTRY-FEEDING EXPERIMENTS.

An elaborate report has been issued by Messrs. J. H. Stewart and H. Atwood, of the West Virginia Experimental Station, on certain poultry-feeding experiments.

Two tests—nitrogenous *v.* carbonaceous rations—were made. In the first, six lots were used, with from ten to twenty fowls in a lot, representing three different breeds. Lots 1 to 3 were fed with the nitrogenous ration, consisting of middlings, linseed meal, ground oats, and corn (Indian) meal in varying proportions, together with ground fresh meat and bone, while lots 4 to 6 received the carbonaceous ration, of which corn meal was the principal constituent. In addition, all the lots had either boiled potatoes or steamed clover hay, and at night all the whole grain they could eat up clean, consisting of corn, oats, and wheat screenings, corn predominating for the lots fed the carbonaceous ration. The test covered seven periods of thirty days each. The financial results are elaborately tabulated, but with the details it is not necessary here to deal. Suffice it that the net profits per 100 hens from the lots fed the nitrogenous ration was within a fraction of £20, and from the lots fed the carbonaceous ration £4 3s. The effect of the two kinds of rations on the fertility of eggs was tested in incubators, and 66 per cent. of the eggs produced on the nitrogenous ration were fertile, and 47 per cent. of the carbonaceous ration only. The average weight per hundred of the former eggs was 12.68 lb., and of the latter, 11.57 lb. only.

The second test was made with four lots of white Leghorn chickens, each containing ten hens and one cock. Lots 1 and 3 were pullets, Lots 2 and 4 old fowls. Lots 1 and 2 were fed the nitrogenous, and Lots 3 and 4 the carbonaceous ration. The test covered seven periods of 30 days each. All the lots were fed a mash of ground feed in the morning, Lots 1 and 2 receiving meat meal in addition during the first four periods, and ground fresh meat and bone during the remainder of the test. During periods two, three, and four all the lots were given boiled sugar beets, but, "as the beets seemed to be making the fowls too fat, they were then dropped from the ration, although the fowls were very fond of them." All the lots were fed at night as much grain as they would eat up clean. The results were calculated per 100 fowls. On this basis Lots 1 and 2 weighed 227 and 304 lb. at the beginning of the test, and 272 and 273 at the close; while lots 3 and 4 weighed, respectively, at the beginning 213 and 263, and at the close 250 and 300 lb. Calculated per 100 hens, the fowls fed the nitrogenous ration laid 7,555 eggs, and those fed the carbonaceous ration 3,431.

FEEDING FOUL BROOD HONEY.—Honey from colonies affected with foul brood should not be used as bee food, although it is perfectly good for other purposes. Boiling it will make it safe, but it is better not to use it.

FRUIT TREE PRUNING.

BY A. DESPEISSIS.

The general principles of pruning have already been discussed in the previous issue of the *Journal of the Department of Agriculture*, and to these the reader must be referred. Several of the most approved methods of vine pruning have also been reviewed and illustrated by means of diagrams in the same publication. In this chapter the shaping and the pruning of the several varieties of those temperate climate fruit trees grown in our orchards will be more particularly referred to.

GENERAL PRINCIPLES.

There are a few rules, however, which are applicable in every circumstance, and which should be borne in mind whatever the system of training or the kind of tree to be pruned may be. Thus, when pruning, cut off all dead wood; also one of any two branches which may happen to cross and rub against each other, thus chafing the bark and injuring the limb. Suppress water shoots and suckers. When cutting to a bud do not leave a stump above the bud; but on the other hand do not cut the wood off too close to that bud. When compelled to cut large limbs, pare off the wound with a sharp knife, and cover the wound with some dressing, such as already recommended in the previous chapter on pruning (p. 316), or even with clay, which, while preventing the air and the dampness from drying and rotting the wood, will not prevent the young bark overgrowing the wound and gradually healing it. Before cutting a limb off try to see what the result of your action is likely to be a few years hence, and thus save at an early stage the possible necessity of having to cut large limbs at some future period.

Should it be found necessary to cut a large limb, saw it a short distance from the bottom first. Then saw down from above, and the limb can be removed without fear of splitting off below. Never cut a branch without having a reason for doing so. Under the climatic conditions which prevail here, it is better to err on the side of cutting hard back, so as to keep the tree low, than on the side of sparing the tree the first years of its growth, and letting it run up a high stem, topped with long, lanky branches.

SYSTEMS OF TRAINING AND SHAPING FRUIT TREES.

Climatic conditions to a great extent influence the methods of training trees. Thus in colder climates they are often trained *Cordon* fashion, or in *Espaliers*. Then again the *Pyramid* shape was for a long time a favorite in warmer climates, until the *Low Standard* or *Vase* system supplanted it.

This latter method of training fruit trees has been found by long experience to be the form best suited to the Australian climate, it is also the one best adapted to Californian conditions. Unlike the *pyramid* shape, which has the cone pointing upwards, the *vase*

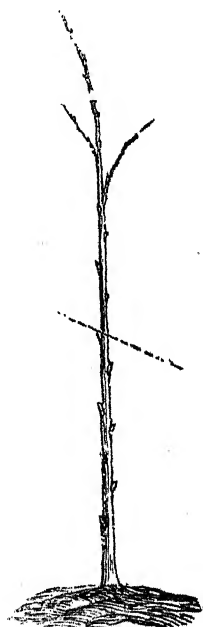
goblet or *wine-glass* form, as it is at times called, rests on its cone, and directs its branches upwards and outwards.

Amongst the advantages it offers it is simple to understand and to master; it is applicable to all kinds of fruit trees; it is suitable to all localities where fruit trees can be grown out in the open without artificial shelter; it forms a vigorous, stocky tree, well balanced, easy to prune, spray and pick; it efficiently shelters the stem against sun scald; it resists the onslaughts of heavy gusts of wind better than the other forms of training; it requires less space than the *pyramid* form; it offers greater facility of approach to the stems by the horses when cultivating.

FIRST PRUNING.

Young budded trees in nursery rows present the first season of their growth the appearance of a straight switch, with good buds all along the stem. Sometimes they grow so vigorously that they throw out laterals. Both such young trees are found in nurseries. As their customers like to see as much growth as possible, nurserymen generally send out their trees without cutting them back.

Experienced orchard owners generally prefer, when ordering from the nursery, one year old trees, which are merely straight switches with good buds all along the stem. These they can cut back to the height they prefer, with a length of stem pretty well uniformly the same all through the orchard. If they plant trees with a head ready formed in the nursery they cut it short back on the laterals. Those who, on the other hand, have little or no experience of fruit growing, would do wisely to select from the nursery trees with their heads ready formed. When cutting back, especially in the warmer and drier localities, a stem, 12 to 18 inches high, will be found the best. In the cooler districts it can be given a height of 18 to 24 inches. Cut back to a good bud, care having been taken that the tree has not been planted too deeply, but that its collar, or point of junction between the roots and the stem, be as nearly as possible flush with the surface of the ground. If the tree has suffered much, and the buds are very small, the bark leathery and wrinkled, the stem somewhat dried and the roots much injured, it is advisable to cut the stem lower still, say at a height of about 9 inches from the ground, or even lower, but in every case above the graft. In such cases, however, the proper height should be given to the stem, either by pinching the straight



A YEARLING TREE WITHOUT BRANCHES. The cross line shows where to cut back when planting.—BARRY.

shoot which will grow from it, as soon as it reaches that desired height, or by cutting it back later on at the time of winter pruning. From a stem topped to a height of 15 to 18 inches, several short shoots will be sent up from the upper buds; of these three or four of the best shoots, placed symmetrically round the stem, are allowed to grow, all superfluous vegetation being rubbed off. These three or four shoots, which will form the main limbs of the tree, should be placed in such a manner that they form a well balanced head, and do not all come out together, but spring out of the stem with an interval of an inch or two between them. This knits them better to the trunk, and they are thus less liable to split, as they sometimes do in windy weather, when grown in forks and laden with fruit. The apricot more especially, with buds very close together, has a tendency to grow its limbs all in a bunch.

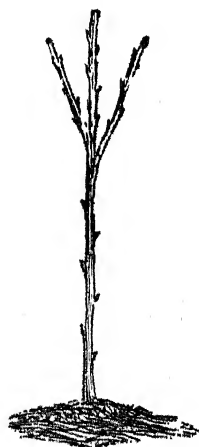
Three limbs growing symmetrically round the stem are better than four. During the first season, these three or four shoots are left to grow without interference, so as to favor as good a root system as possible. Should one of the rods, however, grow with such exuberent vigor that it draws all the sap for its own use, to the detriment of the other two or three, it would be advisable to pinch it off and check it, so as to maintain a fairly equal growth of the head. A tree is very easily thrown off its balance at this stage of its growth, and unless properly trained and watched it might be difficult subsequently to re-establish the harmony of growth between the main branches that constitute the head.

SECOND PRUNING.

During the summer following the first pruning, the young tree should be allowed to grow unchecked, so as to ensure a good root development. Some young trees, however, at times persist in sending up one solitary shoot. Should this be the case, the tender growth is pinched back when it has reached a length of five or six inches, and this will excite the bud immediately underneath into life, with the result that the three or four limbs required to form a well balanced head will be secured.

The reverse at other times happens. The young trees sending up a bunch of shoots, or such vigorous and luxuriant shoots that there is danger of the stems splitting. To guard against this, it is in such case also, although for a different purpose advisable to take in the sails, and relieve the plant of any excess of shoots, or of its threatening top weight.

During the first winter following the planting of a yearling tree, the three shoots, or may be the four which constitute its head, are shortened to four to ten inches, according as to whether these shoots are feeble, or strong and vigorous. Fruit-



Pruning of a two year old tree from the bud.
—BARRY.

growers often get their trees from the nursery at this stage of their growth, and the accompanying figure illustrates their shape after pruning. This operation excites the somewhat dormant buds at the base of the shoot into active life. As previously said, the terminal bud should be a plump and healthy one. It should be directed either upwards, downwards, or sideways, so as to prolong the growth of branch outwards or inwards, or towards a lateral blank space.

The growth of the main shoots is regulated by pinching, and should a third or fourth twig grow amongst them between the forks they are rubbed off. When the tree is ready for pruning a third time it has then, if three main limbs only, six branches, which, at the time of the

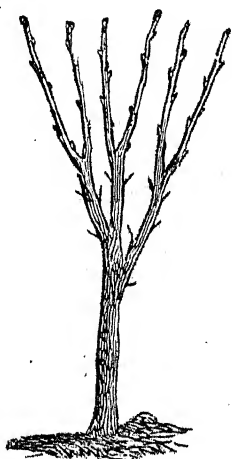
THIRD PRUNING,

Are cut back to 6 to 12 inches, according to their strength. Two of the top shoots on each of these branches with an upward direction are left, and the lateral shoots from the other buds on the limbs below are pinched back in the summer time, when they are a few inches long, to four or five leaves.

These little tufts of leaves shelter the branches, strengthen them by converting sap into woody tissues, and ultimately develop fruit spurs. Branches which approach the vertical line most are cut shorter than those inclined to an angle to thus force the buds at the base to grow.

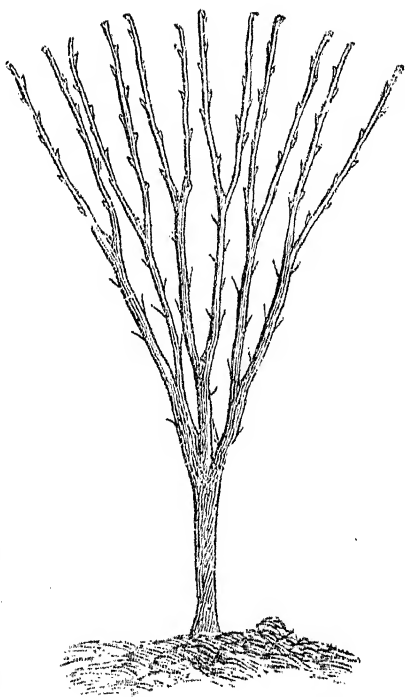
FOURTH PRUNING.

The same treatment described in the case of the first, second and third pruning is applied in the case of the fourth pruning, and generally at this age the tree will begin to bear readily. At this period a stocky, low standard tree will have been formed, which will have a well-balanced head, constituted of branches growing in an upward direction, and carrying fruit spurs all along their length. Such a tree will resist high winds well, can easily be approached by horse and implements, so that comparatively little hand labour will be required to keep the orchard in a high state of cultivation; the crop will be evenly carried along the main branches, which will not stand in need of artificial props, lest they should break down under the load of fruit which, at this early stage, they will begin to carry. The pinching of the superabundant laterals is best done in the early autumn, when buds, which would otherwise have remained sterile, are transformed into fruit buds. This operation will besides save much butchering in the winter time, as by suppressing either entirely or partly an undesirable shoot at an early stage, much sap, which would be



Winter Pruning of a tree three years from the bud.—BANKS.

turned into wood growth, destined to be cut off in the winter, is saved, and the energy and the vitality of the plant thrown into more useful channels. This practice leads to the enunciation of the fact that severe winter pruning induces wood growth, while summer pruning tends to fruit production. Thus, if a tree is stunted, and for some obscure reason does not make much wood, but shows a tendency to produce more fruit buds than it can safely carry, prune close in the winter; if, on the other hand, a tree grows so quickly that all its energy is wasted in wood and leaves, and does not pause to produce fruit, either summer pruning or root pruning will throw it into bearing. By such means the plant realises, while in full flow of sap, that its constitution has been attacked and its life menaced, will make an effort to reproduce its kind forthwith, and the result will be the evolution of leaf buds into fruit bearing spurs. Subsequent prunings consist mostly in rubbing off water shoots, in suppressing branches that cross and rub against one another, and trimming the twigs and the fresh growth made during the season's growth. At this stage the tree will have ceased making much wood, and will begin the business of setting and carrying fruit.



Young standard tree, four years from the bud, after pruning.—BARRY.

REDUCTION OF SWELLINGS AND HIDE-BOUND TREES.

At the time of pruning swellings are occasionally noticed on the stems or limbs of trees. These swellings are either due to the disproportionate growth of the scion or fruiting part, compared with the stock or root end of the tree.

They may also be due to strings used in previous seasons as ties, which have cut through the bark. These swellings, which interfere with the free circulation of the sap, must be reduced. This is best done by running longitudinal incisions from C. downwards to the stock B. The bark will thus expand, and should the

deformity continue the next season, these incisions should be renewed.

Trees which have been neglected, or whose growth has been stunted by the presence of moss and lichen, scale insects or other pests, or by want of drainage of the soil, by the aridity and poverty of the ground, or are debilitated in consequence of having been allowed to bear too early, often show a miserable, sickly appearance. Their growth is stopped, the bark becomes tough and leathery; they are hide-bound. The cause of the mischief may have already been removed, and still they will make no growth.

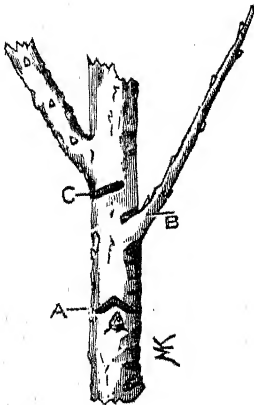
Such trees should be similarly treated at the time of pruning. They should be cut hard back and at pruning time the knife should be run longitudinally through the bark, from the heel to the top of the stem, and even along the main limbs. It is also advisable to whitewash the stems of such trees. Lime, in the shape of whitewash, is well known to be beneficial in most bark diseases.



Incisions to reduce the swelling of the graft or the stem.

Under this treatment the stunted trees of last season are seen to spring into fresh and healthier growth. The cambium or growing wood layers force the strip of leathery bark apart, the stems and limbs are soon seen to swell, the sap runs freely from the roots to the top branches of the plant and the whole growth looks healthier.

INCISIONS TO CONTROL THE GROWTH OF SHOOTS AND BUDS.



INCISIONS.—DU BRENIL.

Should, during the preceding growing season, any one of the lateral branches have been imperfectly developed, it should be cut back lightly when pruning, and if it is much too small compared with the others it is sometimes advisable to make immediately above the point of attachment to the branch (B) a notch or small incision through the outside layers of growing wood, so as to force the sap to run up the branch and develop it. The cut should be prevented from healing too rapidly. It is also sometimes desirable for the symmetry of the tree to force a dormant bud into growth, and in that case an incision as shown at A will be found useful.

On the other hand, should a strong branch become uncontrollable in spite of heading back, it may, in extreme cases, be advisable to check the flow of sap towards it by making an incision as shown at C, immediately below its point of attachment to the stem.

Thus we have a means of transforming a wood bud into a fruit bud and *vice versa*, by making a cut below the rudimentary bud if we want a fruit bud, or above it if we want a wood bud. These methods should, however, be only used with discrimination, else more harm than good will ensue.

RENOVATING OLD TREES.

Fruit trees planted in good soil and possessed of a good stem, are susceptible of living to a great age. It, however, often happens that through years of neglect their branches have grown to excessive length and are, to a great extent, deprived of fruit shoots, or that the crop is carried up too high, hence adding considerably to the cost of gathering; or again the trees are diseased, and in order to successfully combat the pests which infect them they must be shortened in. Again, the variety of fruit the tree bears may be unsuitable, and it may be expedient to change the variety by means of budding or of grafting. In all these cases it may be desirable, or even imperative, to shorten the tree and head it back. For that purpose the saw is called into requisition, and the cuts smoothly pared with a sharp knife, the wound being then smeared with clay, or with the shellac paint, or some of the other paint already referred to.



Top of an old plum tree headed back for the purpose of renovating.

The figure illustrates an old plum tree which has thus been renovated. The plum, better than most other fruit trees, stands cutting back hard to old wood without showing symptoms of dying back, which, under similar conditions, are often shown by apples and more particularly peaches and nectarines.

Early in the spring, the roots of the tree, which may be good for many years more, become active, the sap commences to move upwards and a number of hidden and dormant buds are excited into life. Shoots burst out of the old stumps and as they grow they should be thinned out to the number of three or four only, well placed and likely to form a symmetrical head. Should these few shoots, which are destined to serve as main limbs, grow too rankly, they may be pinched or cut back during the summer, and laterals will grow on the tree, which will be shortened at the time of winter pruning. Should, however, these shoots show only a moderate growth, they are better left alone until the pruning season, when they are cut back and treated as directed under the heading "First and Second Pruning."

Except in the case of plum trees referred to already, it is inadvisable to cut back trees in the process of renovation to blind stumps, but this should always be done just above a young branch or a small shoot, so situated that it can be used for giving start to

the fresh growth. Old apple trees, apricots, and especially peaches are at times killed through overlooking this detail. The sap becomes stagnant, a dying back process sets in, which carries off the limb. Peach trees more particularly must be cut back with judiciousness when it is intended to renovate them, the reason being that fewer buds are found on the old bark of peaches and nectarines than on the old bark of pippins, and what few buds there may be left are less easily thrown into active life again than buds of apple and pear trees. In the case of peach trees, indeed, the basal buds are frequently bloom-buds which blossom and then die off, leaving no wood buds to spring into life at a later period and send up fresh growing shoots.

When renovating trees of the citrus tribe, it is also advisable to cut large limbs above on young, fresh growth, although in their case this is not so essential as in the case of peaches. These trees are fairly well stocked with miniature, dormant buds, which are thrown into life whenever the emergency arises.

THE GROWTH OF FODDER PLANTS.

EXPERIMENTS AT DARDANUP.

Mr. W. A. L. Bocka, of the Wellington Orchard and Vineyard, Dardanup, who received some fodder seeds for experimental purposes from the Department of Agriculture last October, has forwarded the following interesting report to the Secretary of the Department of Agriculture:—

"COLLIER SORGHUM.—Sown October 25th, 1900; ploughed land 6 in. deep; manure, bonedust; soil, red loam resting on yellow subsoil on top of a hill. No rain fell from the time seed germinated until the last day in March. At present the sorghum is green, 8 ft. high, with every prospect of a heavy yield of seeds. It shoots out well, and seems to be one of the best sorghums for our district.

PASPALUM DILATATUM.—Sown alongside sorghum, and only 12 plants came up from an ounce of seed. Seems to be hardier and more succulent than 'Cocksfoot' in the summer months. I anticipate trying this year seed on different soils, viz., strong clay, sand, and ironstone. Should the *paspalum* do well, it will considerably increase the value of ironstone country, of which there is a very large area in this district. It will always be a pleasure to me to assist the Bureau in carrying out experiments on a small scale, as I have had ocular proof of the great value of experimental work at the Roseworthy Agricultural College."

TURNING IN THE STALL.—A horse addicted to this habit should be tied in either corner of the manger in front of him, which at once prevents him getting round. This bad habit, like most others, is generally caused by idleness. The horse gets tired, always standing in one position, and naturally turns round to look about him in order to relieve the monotony.

GARDEN NOTES FOR JUNE.

BY PERCY G. WICKEN.

During this month cold, wet weather is likely to be the predominant feature, and garden work will be at a standstill. Those who have not yet prepared their land for sowing will be at a disadvantage, as the land will not work well when thoroughly wet. Those in the Northern and warmer parts of the State, where the rainfall is not so heavy, may be able to plant and grow vegetables to perfection, but in the South-West, especially the low-lying ground, it will be too wet to attempt much. Root crops, cabbages and cauliflowers, will be the principal vegetables obtainable. For all root crops the ground requires to be deeply worked to a depth of at least 18 inches, so as to enable the roots to penetrate into the soil. Turnips, Swedes, etc., require a good dressing of superphosphate manure to make them fill out. Potatoes require plenty of potash, and mangels are very greedy consumers of nitrogen. Cabbages and cauliflowers are greatly improved by a top dressing of sulphate of ammonia or nitrate of soda, applied at the rate of 1 cwt. per acre. Those who have carried out a system of underground draining will feel the benefit of it during the next few months.

BROAD BEANS.—Sow a few rows to keep up a succession. A liberal supply of stable manure is required, and, where not obtainable, use sulphate of lime and potash manures.

CABBAGE.—Plant out whatever plants you have ready. Be sure and drill a hole large enough to enable the roots to be placed straight into the ground, and not be doubled up. Unless the young plants are properly planted, the results cannot be satisfactory. Plant a fresh supply of seed for future requirements.

CAULIFLOWER.—Treat same as cabbages. This fine vegetable should be largely cultivated. There is always a good market, as the supply is never equal to the demand, and high prices are always obtainable.

CARROTS.—Sow a few more rows to keep up a succession, and thin out those already coming up. Keep the beds well weeded.

LETTUCE.—Plant out any young plants that may be on hand, and sow a supply of seed for further use. To have good crisp lettuce the plants require to be grown quickly, and to do this they require well manured soil.

ONIONS.—Require a rich, well worked soil, with a very fine seed bed. They may either be planted direct in the rows and thinned out, or grown in a seed bed and transplanted into the field. The Giant Rocca is one of the best varieties for autumn planting, but is not a very good keeping variety.

PEAS.—Sow a good supply of this vegetable. Dwarf varieties may be planted in rows 2 feet apart, while the climbing varieties

should be planted from 3 to 4 feet apart. Stake all climbing varieties as soon as they are a few inches high.

TURNIPS.—Those sown early should now be fit for use or to send to market. Thin out all surplus plants, and keep the rows free from weeds. A few more rows may be planted out to keep up a succession.

RADISH.—Thin out those already coming up, and plant out a few more rows for future use.

FARM.—Every effort should now be made to push on with the ploughing and sowing. The earlier sown crops generally give the best returns. The ground should be ploughed as deeply as possible. A small area well worked will give a better return than a large area badly worked. The scarcity of labor is being very severely felt in nearly all districts, and is likely to have an injurious effect on the area of land put under wheat this season. All kinds of cereal crops can now be sown. An article on lucerne on page 358 of this issue calls attention to the value of this plant as a fodder, of which it is one of the most valuable. The cultivator should be kept going between the rows of turnips, rape, etc., so as to keep the land free from weeds. If water is laying on the ground, a few good deep plough furrows should be run along in the direction of the fall of the land, to assist the water to run off. If the land is likely to be very wet, it should be ploughed in narrow lands, with deep finish-off furrows between the lands.

AGRICULTURAL EDUCATION.

On Saturday 1st inst. in response to an invitation from the Santa Rosa Wine and Distilleries Company, Limited, the Agricultural Class at the Perth Technical School, accompanied by their instructor (Mr. P. Wicken, of the Department of Agriculture), paid a visit to the cellars and vineyard at Guildford. After inspecting the cellars, the visitors were entertained at luncheon, at the conclusion of which the company repaired to the vineyard. Here an exhibition of vine pruning was given by Mr. A. Despeissis, the Viticultural Expert to the Department, and the different methods of pruning vines were fully explained. Afternoon tea was provided, after which a hearty vote of thanks was accorded to Mr. A. Despeissis for the practical instruction in pruning which he had given. The party were accompanied by Mr. Cyril Jackson, Inspector-General of Schools, and several other gentlemen.

ANSWERS TO CORRESPONDENTS.

Mr. H. L. Crawford, Brookton, writes:—"Can you tell me how to destroy the common cabbage aphid?" This was submitted to Mr. A. Despeissis, the Viticultural and Horticultural Expert, who replies:—"One of the best remedies is Quassia chips, 1lb.; water, 6 gallons; soap, $\frac{1}{2}$ lb. Sprayed on twice at two or three days' interval. Quassia chips are sold by wholesale druggists for 6d. per lb. Try, if preferred—Quibbel's liquid disinfectant, 1oz.; water, 1 gallon. Or tobacco infusion—Refuse tobacco, 1lb.; water, 6 gallons; soap, $\frac{1}{2}$ lb."

MARKET REPORT.

FOR MONTH ENDING JUNE 6.

The W.A. General Produce Co. report sales effected for the following articles, on account of various consignees, for the month ending June 6: Sales for the month past very substantial, consignments arriving fairly regular in spite of the inclement weather. Bacon, supplies good, quality very satisfactory, also assortment varied. Hams, selling very well, but mostly weights rather light, unsuitable for the trade requirements. Butter, another rise took place since our last report, with present tendency to further advance, thus, very much unsettled. Lard, regular usual outlet. Cheese, rather slow selling. Eggs, local, the cold weather has checked supplies, and though values were depressed, are now re-firming. Potatoes, supplies very good of imported lots—seed in great demand—new, locals, very hard to quit above the price of imported. Onions, unaltered, but quite firm, another rise imminent. Chaff, supplies very good, values normal. Bran and pollard constantly in regular good demand, prices increasing. Flour finds regular outlet at quotations. Oats, unaltered and steady. Wheat, still ruling as hitherto. Barley, for seed purposes in quest. Oil cake, a rise of 10s. per ton is reported, together with previous 5s., thus showing the article has been in favor with consumers. Fruit, citrus kinds, a little more plentiful, whereas apples, pears, etc., scarcer than ever, realising fabulous prices. Vegetables, supplies on the increase. Poultry, fowls still plentiful, values rather weak. Ducks, in good demand. Carcase pork, if of medium size cleanly butchered, sells well. Very good demand for veal. Artificial manures in great request.

Farm and Dairy Produce.—Bacon sides—11d, 11½d to 1s per lb. Hams—1s 1d to 1s 2½d per lb. Butter—Victorian, 1s 6d to 1s 7d per lb. N.Z., 1s 3d to 1s 4½d per lb. Lard—In 1lb. and 2lb. tins, 9d per lb.; 4lb. tins, 8½d per lb. Cheese—Loaf case lots, 8½d to 9d per lb.; medium, 8d to 8½d per lb. Eggs—Local, fresh, 2s 6d to 2s 9d per doz. Potatoes—Imported, £7 to £8 per ton; local, £7 to £8 10s per ton. Onions—Worth 15s per cwt., rising. Chaff—Worth £5 to £5 10s per ton. Bran and Pollard—£7 to £7 10s per ton. Flour—Sacks, £9 10s to £9 15s per ton; quarters, £9 15s to £10 per ton. Oats—N.Z., 3s 3d to 3s 6d per bushel. Maize—Worth 5s 6d to 6s 6d per bushel. Wheat—4s 3d to 4s 6d per bushel, according to quantity and quality. Oilcake £7 10 to £7 15s per ton.

Fruit and Vegetables—Oranges—Local, 9s, 10s, to 11s per case. Lemons—Local, 6s to 6s 6d per case. Mandarines—1s to 1s 6d per doz., according to size. Apples—From 12s cooking sorts to 25s eating qualities. Pears—From 10s to 27s 6d per case. Quinces—5s to 7s 6d per case. Cabbage—Worth from 3s to 6s per cwt. Cauliflowers—Worth from 2s 6d to 15s per dozen. Carrots and Parsnips—1s 6d dozen bunches. Turnips—White, 1s 6d per dozen bunches. Swede—8s per cwt. French Beans—2d to 3d per lb. Pumpkins—Bugle and iron bark, worth 5s to 6s per cwt. Rhubarb—Worth 1½d to 2d per lb.

Salads and Herbs.—Lettuce—Worth 6d to 9d per dozen. Spring Onions—Worth 8d per dozen bunches. Beetroot—Worth 1s 6d to 2s per dozen bunches. Tomatoes—Worth 5s to 6s per case. Celery—1s 3d to 2s per dozen heads. Watercress—Worth 6d per dozen bunches. Thyme—marjorum, sage, off stalk usual price 9d per lb. Mint—Off stalk 6d per lb.

Poultry—Fowls—Worth from 4s to 5s for table sorts. Chickens—From 1s 9d to 3s per pair. Ducks—7s to 7s 6d per pair. Geese—10s to 12s per pair. Turkeys—11s to 18s. Sucking Pigs—4s to 6s each.

Carcase Meat.—Pork—40lb to 70lb., 5½d to 6½d per lb.; 100lb and over, 4d to 4½d per lb. Veal—5d to 6d per lb.

Sundries.—Bonedust—£7 10s per ton. Phosphate—£5 per ton. Superphosphate—£6 10s per ton. Guano—£4 to £5 10s per ton. Coarse Bacon—Salt, £3 10s per ton. New Cornsacks—7s 6d per dozen; second-hand, 4s 6d per dozen. New Bran Bags—4s 7d per dozen; second-hand, 3s 6d per dozen.

THE CLIMATE OF WESTERN AUSTRALIA DURING MAY, 1901.

The winter set in, as it usually does, quite suddenly. It was ushered in by a "low" which approached the S.W. corner of Australia at the end of April, and was apparently prevented by an almost stationery anticyclone in the Eastern States, from making any definite progress. We, therefore, experienced very wet weather throughout the western and south western districts during the first few days of the month, starting with a phenomenally wet day on April 30th, and culminating in heavy thunder and hail storms on the 5th and 6th. Between the 1st and 6th 477 points were recorded at the Perth Observatory. "Highs" and "lows" of no particular consequence then followed until the 16th, when a second period of wet weather set in during the passage of a "low" past our south coast. Then succeeded an anticyclone, which, as it passed rapidly eastward, was followed by a moderate rainfall of the summer type, crossing from the N.W. coast through the Murchison and Goldfields areas on the 22nd and 23rd. The next and principal anticyclone of the month appeared on the S.W. coast on the 25th, and passed along bringing the usual crisp weather and cold frosty nights, especially inland, when the temperature on the surface of the ground fell to 25.0 degrees at Katanning on the nights of the 25th and 26th.

The total rainfall for the month was far in excess of the average for previous years on the west coast. It was also fairly heavy in the central agricultural areas, but on the Goldfields it was very light.

The barometers and temperatures were, on the whole, fairly normal, except in the extreme south, where both were considerably below the averages for previous years, and Karridale recorded the lowest temperature (32.5 degrees) ever registered there for May. At Albany, also, the minimum reached within 0.1 degrees of the lowest record (39.0 degrees).

THE CLIMATE OF WESTERN AUSTRALIA DURING MAY, 1901.

Locality.	Barometer (corrected and reduced to sea level).				Shade Temperature.				Average for Previous Years.				Rainfall.	
	Mean of 9 a.m. and 3 p.m. years.	High-est.	Low-est.	Mean of Month.	Mean Min.	Mean Max.	Highest Max.	Lowest Max.	Mean Min.	Mean Max.	Highest ever recorded.	Lowest ever recorded.	Points (100 to 1 inch in month. Jan. 1.	Total points since Jan. 1.
Wyndham	29.974	29.957	30.097	29.867	72.3	82.4	95.8	64.9	71.2	93.1	106.0	55.0	Nil	1371
Derby	29.983	29.990	30.111	29.839	67.8	79.8	96.0	54.8	64.9	89.5	102.0	46.0	Nil	1028
Broome	29.990	29.988	30.119	29.805	61.8	75.8	95.5	52.0	60.6	87.1	97.3	43.0	Nil	2192
Condon	30.030	30.041	30.162	29.929	54.0	69.8	91.5	49.7	54.7	82.4	98.0	42.0	Nil	2056
Cossack	30.054	30.068	30.235	29.906	64.1	75.2	92.0	56.2	64.4	82.4	98.2	47.0	Nil	637
Onslow	30.014	30.061	30.160	29.894	62.8	74.2	91.8	52.2	56.1	84.1	103.0	36.0	47	173
Carnarvon	30.054	30.032	30.197	29.880	61.4	70.8	91.3	52.3	55.2	81.4	96.0	39.0	154	366
Hamelin Pool	30.073	30.087	30.244	29.862	58.3	68.4	87.8	49.2	55.1	77.1	89.8	44.2	34	48
Geraldton	30.077	30.110	30.323	29.847	56.7	65.2	84.6	39.3	54.3	73.0	93.0	39.5	376	466
Hall's Creek	—	—	—	—	—	—	91.0	—	—	—	—	—	Nil	1465
Marble Bar	—	—	—	—	—	—	95.5	49.2	—	—	—	—	Nil	1202
Nullagine	30.062	—	30.455	29.899	58.4	73.8	95.5	49.2	—	—	—	—	Nil	1531
Peak Hill	30.094	—	30.259	29.822	57.6	71.2	91.0	41.0	—	—	—	—	109	558
Cue	30.112	30.128	30.385	29.819	54.5	65.2	85.8	40.0	50.3	75.0	91.0	35.9	26	317
Yalgoo	30.096	30.127	30.343	29.762	52.0	63.0	86.0	40.0	48.9	73.4	92.2	40.3	57	204
Lawlers	30.144	—	30.454	29.858	52.3	62.9	86.0	34.0	—	—	—	—	59	532
Laverton	30.188	—	30.522	30.016	61.4	69.9	86.0	31.0	—	—	—	—	38	457
Menzies	30.148	30.167	30.498	29.769	50.8	60.8	85.8	36.1	47.2	70.0	89.0	32.1	80	463
Kalgoorlie	30.148	30.168	30.446	29.822	51.0	60.6	84.3	35.4	47.5	68.7	88.1	34.5	59	341
Coolgardie	30.154	—	30.453	29.810	70.2	49.7	84.4	36.0	46.9	68.8	88.4	36.1	43	305
Southern Cross	30.129	30.153	30.479	29.737	69.1	44.1	84.8	33.4	43.5	69.5	90.0	30.8	133	227

The figures for previous years have been given whenever there are at least three years' complete records. This number is a very low one upon which to base averages, but otherwise the Goldfields would be excluded.

THE CLIMATE OF WESTERN AUSTRALIA DURING MAY, 1901.—Continued.

Locality.	Barometer (corrected and reduced to sea level.)				Shade Temperature.				Average for Previous Years.				Rainfall.	
	Mean of 9 a.m. and 3 p.m.	Average for previous years.	High est.	Low est.	May 1901.				Mean Max.	Min.	Highest ever recorded.	Lowest ever recorded.	Points (100 to inch) in month.	Total Points since Jan. 1.
					Mean Max.	Min.	Mean of Month.	Highest Max.						
Northam ...	...	...	...	...	...	...	59.4	85.0	68.0	46.2	85.0	30.0	227	339
York ...	30.126	30.124	30.492	29.754	68.6	50.1	59.7	85.0	68.0	46.2	85.0	30.0	187	345
Guildford ...	...	...	...	...	69.5	49.9	59.7	85.0	70.2	50.5	92.0	34.0	533	755
Perth Gardens ...	30.108	30.116	30.474	29.692	68.4	52.5	60.4	81.2	69.3	52.3	82.4	38.6	751	960
Perth Observatory ...	30.116	30.150	30.472	29.678	68.0	52.8	60.4	81.8	68.2	53.9	86.0	40.0	733	951
Fremantle ...	30.062	30.090	30.451	29.620	67.2	55.4	61.3	74.4	68.2	53.9	86.0	40.0	577	790
Rottnest ...	30.082	30.050	30.437	29.652	67.3	57.8	62.6	75.0	68.7	55.2	87.5	40.5	516	656
Mandurah ...	...	...	...	...	67.9	56.6	59.2	74.5	...	...	...	...	665	851
Wandering ...	...	...	...	...	...	...	...	...	...	...	...	...	361	538
Collie ...	...	...	...	...	64.7	41.0	52.9	77.4	...	...	...	...	782	1010
Dardenup ...	...	...	...	...	67.8	50.6	59.2	74.2	66.9	50.0	84.0	33.0	667	1009
Bunbury ...	30.062	30.106	30.464	29.623	66.0	49.4	57.7	70.3	66.9	50.0	84.0	33.0	697	1083
Busselton ...	...	...	...	...	65.9	42.7	54.3	77.0	...	...	...	...	446	876
Bridgetown ...	...	...	...	...	65.1	56.0	60.6	72.8	69.1	48.7	81.1	33.2	645	951
Karridale ...	30.064	30.130	30.442	29.520	64.7	56.1	60.6	70.6	66.3	56.4	77.2	47.5	852	1348
Cape Leeuwin ...	30.032	30.096	30.444	29.372	64.2	45.9	55.0	79.0	65.8	43.3	79.0	30.5	724	1114
Katanning ...	30.080	30.133	30.508	29.671	66.9	48.5	57.7	81.2	65.8	43.3	79.0	30.5	362	722
Albany ...	30.079	30.099	30.500	29.558	65.6	55.3	60.4	75.0	63.5	50.6	80.0	39.0	223	660
Breaksea ...	30.064	...	30.508	29.524	70.0	50.8	60.4	86.0	64.2	54.2	78.2	46.8	172	474
Esperance ...	30.118	30.116	30.502	29.700	71.1	50.8	61.0	91.2	68.0	49.8	86.0	34.0	150	461
Eyre ...	30.149	...	30.430	29.763	...	...	...	...	...	...	...	...	81	246

The figures for previous years have been given whenever there are at least three years' complete records. This number is a very low one upon which to base averages, but otherwise the Goldfields would be excluded.

THE OBSERVATORY, PERTH, 5th June, 1901.

W. E. COOKE. Government Astronomer.

RAINFALL for April, 1901 (completed as far as possible),
and for May, 1901 (principally from Telegraphic Reports).

STATIONS.	APRIL.		MAY.		STATIONS.	APRIL.		MAY.	
	No. of points, 100 equals lin.	No. of wet days.	No. of points, 100 equals lin.	No. of wet days.		No. of points, 100 equals lin.	No. of wet days.	No. of points, 100 equals lin.	No. of wet days.
EAST KIMBERLEY:					N'TH-WEST--Cont.				
Wyndham ..	Nil	..	Nil	..	Tambrey ..	..	..	..	..
6-Mile ..	..	..	..	..	Millstream ..	..	..	..	..
Carlton ..	..	..	..	..	Mallina ..	..	..	..	..
Denham ..	..	..	..	..	Whim Creek ..	Nil	..	Nil	..
Rosewood Downs ..	..	..	..	..	Cooyapooya ..	Nil	..	..	..
Argyle Downs ..	Nil	..	..	..	Woodbroke ..	Nil	..	..	..
Lisadell ..	..	..	..	..	Croydon ..	..	..	..	..
Turkey Creek ..	Nil	..	Nil	..	Balla Balla ..	Nil	..	Nil	..
Ord River ..	Nil	..	..	..	Roebourne ..	Nil	..	Nil	..
Koojubrin ..	..	..	..	..	Cossack ..	Nil	..	Nil	..
Hall's Creek ..	Nil	..	Nil	..	Fortescue ..	Nil	..	5	1
Flora Valley ..	..	..	..	..	Mardie ..	Nil	..	..	..
Ruby Creek ..	..	..	..	..	Mt. Stewart ..	..	..	..	..
Denison Downs ..	..	..	..	..	Yarraloola ..	..	..	..	..
					Chinginarra ..	Nil	..	..	..
WEST KIMBERLEY:					Peedamullah ..	Nil	..	..	..
Obagama ..	Nil	..	..	..	Onslow ..	Nil	..	47	2
Derby ..	Nil	..	Nil	..	Peedamullah ..	Nil	..	..	..
Yeeda ..	..	..	..	..	Red Hill ..	Nil	..	..	..
Liveringa ..	Nil	..	..	..	Mt. Mortimer ..	Nil	..	..	..
Mt. Anderson ..	..	..	..	..	Nanutarra ..	..	..	..	..
Leopold Downs ..	3 ¹	1	..	..	Point Clontes ..	Nil	..	257	2
Fitzroy Crossing ..	Nil	..	Nil	..	GASCOYNE:				
Quambun ..	Nil	..	..	..	Winning Pool ..	Nil	..	79	5
Nookanbah ..	..	..	..	..	Towara ..	..	..	..	..
Broome ..	Nil	..	Nil	..	Ullawarra ..	..	..	..	..
Thangoo ..	..	..	..	..	Woorkadjia ..	Nil	..	..	..
La Grange Bay ..	1	1	Nil	..	Bangemall ..	Nil	..	..	..
NORTH-WEST:					Yanyearaddy ..	Nil	..	..	..
Wallal ..	Nil	..	Nil	..	Boolathanna ..	Nil	..	..	..
Condon ..	Nil	..	Nil	..	Carnarvon ..	Nil	..	154	..
DeGrey River ..	Nil	..	..	..	Dirk Hartog Is. ..	Nil	..	..	..
Port Hedland ..	Nil	..	Nil	..	Mungarra ..	Nil	..	..	..
Boodarie ..	Nil	..	..	..	Clifton Downs ..	Nil	..	..	..
Yule River ..	Nil	..	..	..	Dairy Creek ..	Nil	..	..	..
Warralong ..	Nil	..	..	..	Tamala ..	..	..	..	..
Muccan ..	..	..	..	..	Sharks Bay ..	Nil	..	24	7
Mulgie ..	..	..	..	..	Meedo ..	Nil	..	..	..
Bel Creek ..	Nil	..	..	..	Wooramel ..	Nil	..	117	5
Coongon ..	..	..	..	..	Hamelin Pool ..	Nil	..	32	6
Warrawagine ..	..	..	..	..	Byro ..	5	1	..	..
Bamboo Creek ..	Nil	..	Nil	..	Mt Gould ..	Nil	..	..	..
Marble Bar ..	Nil	..	Nil	..	Peak Hill ..	18	..	109	..
Warrawoona ..	Nil	..	Nil	..	Horseshoe ..	1	1	..	..
Corunna Downs ..	..	..	..	..	Abbotts ..	22	2	65	3
Nullagine ..	Nil	..	Nil	..	Belele ..	Nil	..	..	..
Yandicoogina ..	Nil	..	Nil	..	Mileura ..	48	1	..	..
Tambourah ..	Nil	..	Nil	..	Bernier Island ..	..	..	..	..
Roy Hill ..	..	..	..	..	Manfred ..	27	2	..	..
Woodstock ..	..	..	..	..	Meelya ..	..	..	..	..

RAINFALL.—Continued.

STATIONS.	APRIL.		MAY		STATIONS.	APRIL		MAY	
	No. of points 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points, 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
GASCOYNE—Cont.					S. W. Div.—Cont.				
Woogorong ..	Nil	..	..	..	Guildford ..	28	4	523	15
Billabolong ..	114	3	..	..	Kallyamba ..	65	6	..	..
Murgoo ..	Nil	..	..	..	Can'ing W'works	50	3	..	..
Meka ..	2	1	..	..	Perth Gardens ..	48	5	751	16
Mt. Wittenoom ..	13	1	..	..	„ Observatory	45	5	733	16
Nannine ..	Nil	..	33	2	Subiaco ..	39	5	745	16
Star of the East	Nil	..	58	4	Claremont ..	32	4	602	13
Tuckanarra ..	10	1	..	..	„ Richardson	36	3	..	..
Coodardy ..	Nil	..	41	3	Armadales ..	40	4	..	..
Cue ..	10	1	26	2	Fremantle ..	33	8	577	15
Day Dawn ..	4	1	27	2	Rottneft ..	17	3	516	..
Lake Austin ..	15	2	45	4	Rockingham ..	38	4	564	13
Lennonville ..	8	1	65	12	Canning River ..	202	7	615	13
Mt. Magnet ..	17	1	55	3	Jarrahdale ..	30	2	770	12
Challa ..	31	1	56	3	Mandurah ..	37	4	665	12
Yoneragabbie ..	..	..	..	..	Pinjarrah ..	69	3	739	14
Murrum ..	60	2	52	2	Harvey ..	29	5	663	17
Yalgoo ..	25	..	57	..					
Gabyon ..	Nil	..	..	..	SOUTH-WEST, CENTRAL PART (IN-				
Gullewa ..	Nil	..	158	8	LAND):				
SOUTH-WEST DIVISION (N'N PART):					Momberkine ..	Nil	..	278	4
Murchison House	Nil	..	..	..	Culham ..	14	4	296	9
Mt. View ..	2	1	..	..	Newcastle ..	8	3	331	11
Yuin ..	..	..	104	3	Eumalga ..	17	4	306	11
Northampton ..	Nil	..	306	9	Northam ..	8	5	227	10
Mt. Erin ..	4	1	..	..	Grass Valley ..	12	3	232	5
Oakabella ..	Nil	..	..	..	Meckering ..	4	2	285	7
Tibradden ..	2	1	291	10	Doongin ..	7	2	..	..
Sand Springs ..	Nil	..	307	10	Whitehaven ..	20	4	273	8
Mullewa ..	Nil	..	242	8	Sunset Hills ..	13	3	253	12
Bootenal ..	6	1	456	10	Cobham ..	19	3	219	12
Geraldton ..	10	2	376	..	York ..	17	4	187	..
Greenough ..	10	2	499	12	Beverley ..	14	3	224	12
Dongara ..	1	1	504	10	Barrington ..	13	2	216	11
Dongara (Pearse)	1	1	519	11	Sunning Hill ..	22	2	282	8
Strawberry ..	Nil	..	..	..	Wandering ..	31	6	361	13
Minginew ..	Nil	..	440	13	Pingelly ..	32	5	175	9
Field's Find ..	16	1	..	..	Marradong ..	24	4	440	11
Carnamah ..	3	1	340	10	Bannister ..	14	6	445	15
Watheroo ..	5	3	363	11	Narrogin ..	16	4	217	13
Dandaragan ..	32	5	521	11	Wickepin ..	12	3	..	..
Moorra ..	19	4	366	9	SOUTH-WEST DIVISION (S'N PART):				
Yatheroo ..	32	4	440	10	Bunbury ..	103	4	697	16
Walebing ..	27	4	385	12	Collie ..	104	6	..	..
New Norcia ..	27	4	387	11	Salvation Army				
SOUTH-WEST DIVISION, CENTRAL (COASTAL):					Settlement ..	102	4	647	13
Gingin ..	15	4	721	14	Glen Mervyn ..	95	3	646	12
Mundaring ..	39	4	..	..	Dardanup ..	129	5	667	16
Belvoir ..	34	3	602	13	Donnybrook ..	176	4	811	15
					Boyanup ..	177	7	870	17

RAINFALL.—Continued.

STATIONS.	APRIL.		MAY		STATIONS.	APRIL		MAY	
	No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.		No. of points. 100 equals lin.	No. of wet days.	No. of points. 100 equals lin.	No. of wet days.
SOUTH-WEST—Cont.					EASTERN DIV.—Cont.				
Busselton ..	137	10	446	15	Mt. Morgans ..	Nil	..	62	4
Quindalup ..	145	7	499	14	Laverton ..	Nil	..	38	..
Margaret River..	187	5	..	..	Murrin Murrin ..	3	1	60	6
Lower Blackwood	130	5	615	12	The Granites ..	Nil	..	40	1
Karridale ..	217	12	852	..	Tampa ..	Nil	..	..	..
Augusta ..	202	8	655	18	Niagara ..	Nil	..	44	3
Cape Leeuwin ..	202	..	724	23	Yerilla ..	Nil	..	..	..
Biddellia ..	97	2	..	..	Menzies ..	Nil	..	80	5
The Warren ..	204	7	..	..	Mulline ..	Nil	..	..	..
Lake Muir ..	151	10	284	19	Goongarrie ..	Nil	..	50	6
Mordalup ..	102	9	216	18	Kurawa ..	Nil	..	46	5
Deeside ..	176	6	288	14	Dixie Gold Mine	Nil	..	37	4
Riverside ..	177	8	370	18	Kurnalpi ..	Nil	..	58	4
Balbarup ..	315	10	460	16	Bulong ..	Nil	..	49	5
Wilgerup ..	174	8	479	17	Kanowna ..	Nil	..	36	..
Mandalup ..	107	5	668	15	Kalgoorlie ..	Nil	..	59	5
Bridgetown ..	137	9	645	17	Coolgardie ..	2	1	43	4
Greenbushes ..	286	5	659	9	Burbanks ..	2	1	38	3
Williams ..	30	8	286	13	Londonderry ..	..	..	..	..
Arthur ..	38	5	258	..	Woolubar ..	Nil	..	35	4
Darkan ..	49	4	368	12	Widgiemooltha..	1	1	30	5
Wagin ..	18	3	203	11	50-Mile Tank ..	4	1	21	3
Glencove ..	15	4	253	14	Norseman ..	4	2	29	5
Dyiliabing ..	24	3	..	..	Bulla Bulling ..	Nil	..	..	..
Katanning ..	36	6	362	12	Woolgangie ..	..	..	..	..
Kojonup ..	41	2	362	9	Boorabbin ..	9	4	52	5
Broomehill ..	58	6	242	13	Karalee ..	23	2	..	..
Sunnyside ..	57	4	302	13	Yellowline ..	..	..	..	..
Woodyarrup ..	131	10	321	16	Southern Cross..	10	3	133	7
Cranbrook ..	81	8	142	6	Mount Jackson ..	..	..	..	..
Blackwattle ..	96	8	..	..	Burracoppin ..	38	2	185	5
Mt. Barker ..	133	9	193	13	Kellerberrin ..	18	2	186	7
Kendenup ..	83	9	202	13	Mangowine ..	39	4	245	9
St. Werburgh's...	145	11	..	..	Waltoning ..	45	3	..	..
Forest Hill ..	190	10	..	..	EUCLA DIVISION:				
Denmark ..	165	7	308	14	Ravensthorpe ..	70	6	..	..
Albany ..	154	10	223	14	Coconarup ..	49	8	..	..
Point King ..	160	8	238	11	Hopetoun ..	49	8	..	..
Breaksea ..	132	12	172	12	Fanny's Cove ..	21	5	..	..
Cape Riche ..	65	5	106	6	Park Farm ..	24	4	..	..
Pallinup ..	118	5	289	14	Esperance ..	32	5	150	..
Bremer Bay ..	40	8	302	11	Gibson's Soak ..	70	6	..	..
Jarramongup ..	117	11	..	..	30-Mile Condenser	18	2	..	..
EASTERN DIVISION:					Swan Lagoon ..	21	7	..	..
Lake Way ..	Nil	..	49	5	Lynburn ..	25	..	..	..
Mt. Sir Samuel ..	Nil	..	57	5	Grass Patch ..	20	5	..	..
Lawlers ..	Nil	..	59	..	Israelite Bay ..	47	5	68	6
Diorite King ..	Nil	..	85	4	Frazer Range ..	..	..	..	..
Sturt Meadows ..	..	..	..	..	Balladonia ..	32	1	42	3
Mt. Leonora ..	Nil	..	76	4	Eyre ..	50	3	81	..
Mt. Malcolm ..	Nil	..	61	2	Eucla ..	102	3	114	8

RETURN OF FRUIT IMPORTED INTO WESTERN AUSTRALIA DURING MAY, 1901.

NAME OF PORT	No. of Ships.	No. of Consignments Inspected.	Total No. of Cases.	No. of Cases Passed.	No. of Cases Prohibited.	No. of Cases Destroyed.	No. of Cases in Quarantine.	No. of Cases Dipped.	No. of Cases of															
									Apricots.	Bananas.	Cherries.	Gooseberries.	Grapes.	Lemons.	Nectarines.	Oranges.	Passion Fruit.	Peaches.	Plums.	Rhubarb.	Strawberries.	Pomeloes.	Pines.	All other fruits.
FERMANVILLE ..	9	10	1503	1503	..	..	..	1503	..	269	..	..	..	115	..	252	50	..	278	..	..	..	..	..
ALBANY ..	5	5	96	93	3	..	..	96	..	40	..	..	..	7	..	22	..	..	24	..	..	..	..	..
GERALDTON ..	1	1	loose fruit	..	..	..	..	..	..	*	..	..	..	..	..	..	..	..	..	..	..	..	..	..
HAMELIN ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSETTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BURBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL ..	15	16	1599	1506	3	..	..	1599	..	269	..	..	..	122	..	274	50	..	282	..	..	..	..	..
* loose fruit																								

1703b loose fruit

DEPARTMENT OF AGRICULTURE,

5th June, 1901.

RETURN OF FRUIT TREES AND PLANTS IMPORTED INTO WESTERN AUSTRALIA DURING

MAY, 1901.

NAME OF PORT.	No. of Ships.	No. of Consign- ments of Trees or Plants.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments Passed.	Total No. of Trees or Plants in such Consignments.	No. of Consign- ments of Trees or Plants Prohibited.	Total No. of Trees in such Consignments.	No. of Packages Dipped.	No. of Trees.											All Other Trees	
									Ornamental & Pot Plants.	Almonds.	Apples.	Apricots.	Cherries.	Pigs.	Lemons.	Limes.	Mulberries.	Oranges.	Peaches.		Pears.	Plums.	Small Fruits.	Vine Cuttings.
FREMANTLE ..	10	12	4225	11	4225	..	4225	39	1520	530	150	50	..	..	50	200 300	150	100	950	..	225
ALBANY ..	3	3	300	3	300	..	300	8	300	..	..	..	..	..	..	..	..	..	..	..	..
GERALDTON ..	1	1	200	1	200	..	200	1	..	..	..	..	..	..	170	..	30	..	..	..	..
HAMELIN ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUSSELLTON ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
BUNBURY ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
ESPERANCE ..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
TOTAL ..	14	16	4725	15	4725	..	4725	48	1820	530	150	50	50	370 300	150	100	950	..	225

DEPARTMENT OF AGRICULTURE,
5th June, 1901.

I. A. R. I. 75.

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